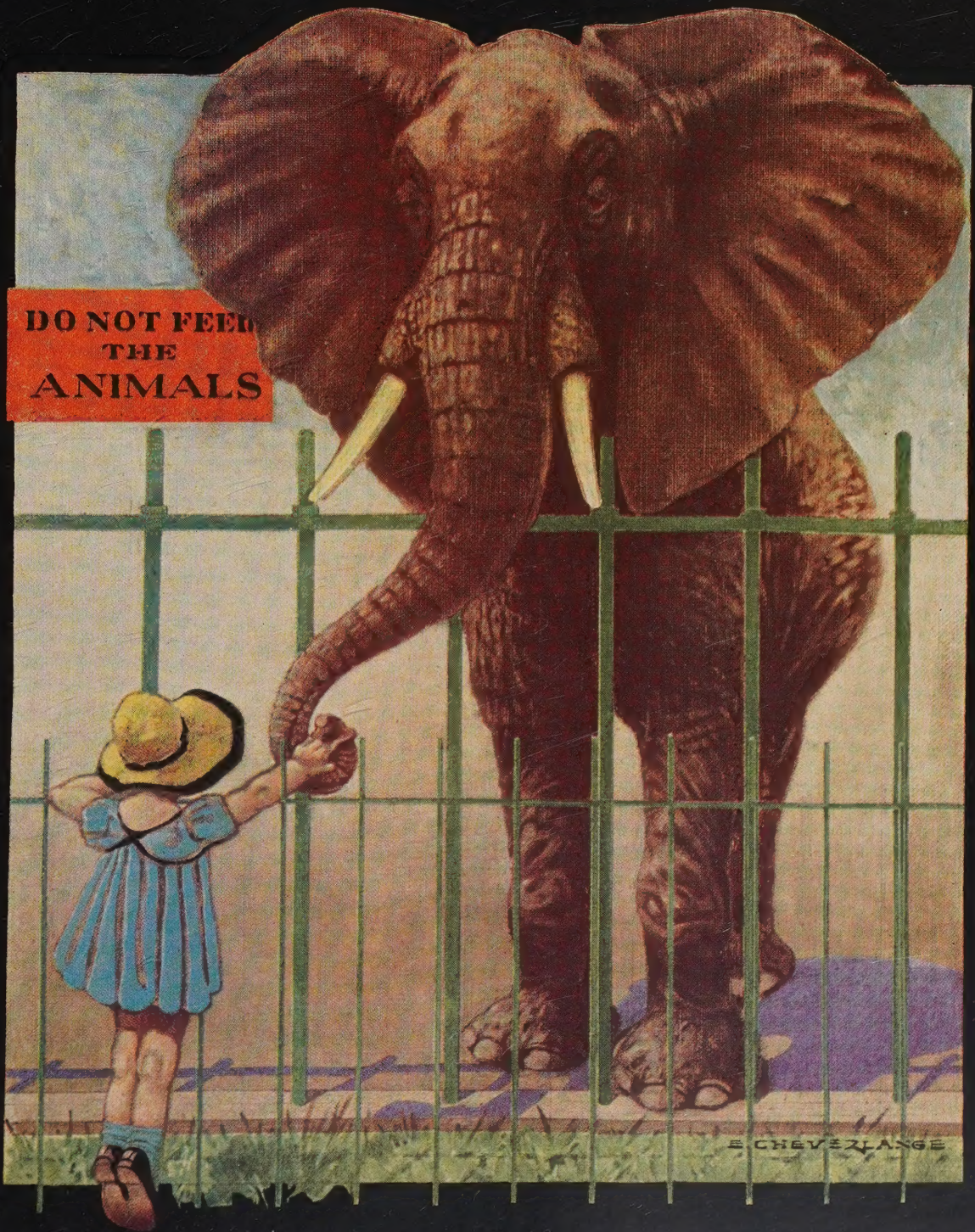
NATURE MAGAZINE



JUNE 1932 35¢ VOL. 19, NO. 6

-EAST- MICHIGAN

Here is the peace of woods and waters

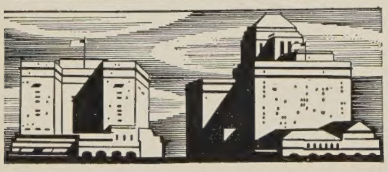
IN ITS wildernesses of woods and waters, its deep forests of pine and birch, its gorgeous Huron Shoreline and its inland lakes and rivers—East Michigan offers rest to tired city nerves.

And throughout its entire length, its wildest paths are within easy distance of modern hotels and camps and cottages! Follow them this summer!

• • •

WRITE *for free literature; or send 4¢ postage for All-Michigan booklet.*

EAST MICHIGAN
TOURIST ASSOCIATION
Dept. 7
Bay City Michigan



You'll feel at home

CHALFONTE-HADDON HALL is the perfect place for a vacation for the whole family. Here you will find comfort and hospitality.

There are the zestful pleasures of the seashore. Bathing. Golf. Long hours on the beach or on the Ocean Deck.

To children this is a paradise. They have their own special playrooms. They can dine at the family table, or in their own gay dining-room. Their days are brimful of interest and healthful activity.

Write to us for information.

American and European Plans

CHALFONTE-HADDON HALL

ATLANTIC CITY

Leeds and Lippincott Company

from $2.50 SINGLE
3.00 DOUBLE
ROOM and BATH

HOTEL
PICCADILLY
45 ST. WEST of BROADWAY
NEW YORK
NEW • MODERN • REFINED

The Seymour

50 W. 45 ST. RUNNING THROUGH TO 43 W. 44 ST.

One half block west of Fifth Avenue; NEW YORK large rooms, high ceilings, quiet; selected patronage; opposite or adjacent to the following clubs; Harvard, New York Yacht, Army and Navy, City, Coffee House, Bar Association.

J. HOWARD SLOCUM, *Manager*

Also Operates
PRINCETON INN
PRINCETON, N.J.
FLANDERS
OCEAN CITY, N.J. *Summer*

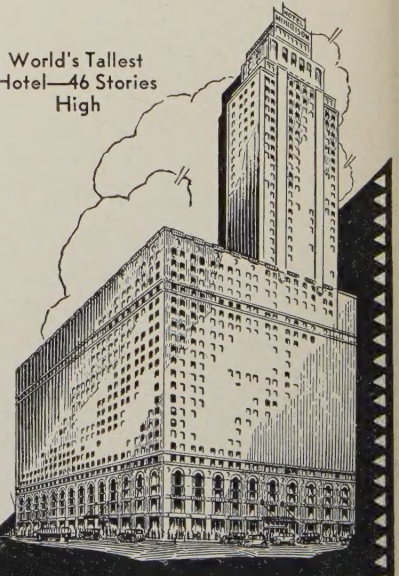
2500 Rooms $3.00 UP

CHICAGO'S
Most Famous Hotel

HERE amid an atmosphere of refinement the slightest needs of guests are anticipated. Reasonable rates prevail always. *The central location of this hotel makes it the nearest to stores, offices, theatres and railroad stations.*

Each guest room is outside with bath, circulating ice water, bed-head reading lamp and Servidor. Special floor reserved for ladies. Excellent garage facilities. Write or wire for reservation.

LEONARD HICKS
Managing Director

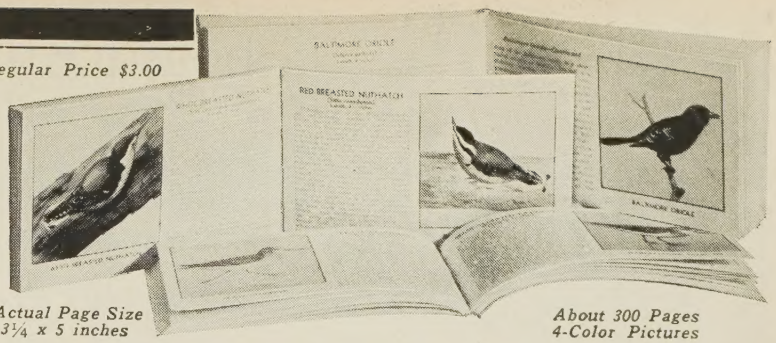


MORRISON HOTEL
Madison and Clark Streets
"In the Heart of the Loop"
CHICAGO

These Bird Guides **FREE!**

Until June 30, 1932

Regular Price $3.00



Actual Page Size 3¼ x 5 inches

About 300 Pages 4-Color Pictures

The Birds of America, 3 Volumes. Identifying the birds and describing their appearance and habits briefly but completely. A Fascinating Springtime Gift to you with the complete

Nature Writings of John Burroughs —at a saving of 70%

IF you love to walk in the fields and woods and long to know more about the life that is going on around you, John Burroughs will come as a delightful guide and companion. No secret way of bird or squirrel or bee was unknown to his inquiring and compassionate eye. No bird-song but brought him a thrilling message. Plants and trees told him their deepest secrets. The very rocks and boulders unfolded an astounding epic of Creation.

Nature's Own Story-Teller

Burroughs made himself Nature's disciple, writing down her stories for the children of men. Everything his pen touches takes on beauty and fascination. The man speaks to you as simply, as directly as if you stood in his presence or strolled with him through his favorite haunts. He gives you a keen vision of what is going on above you and beside you and beneath your feet. He notices everything and fills you with intense wonder and delight in the presence of Nature. Come walk with 'John O'Birds,' of whom Pres. Roosevelt said: "It is a good thing for our people you have lived!"

Find Health and Contentment

The Nature Writings of John Burroughs bring you contentment, peacefulness and joy. They encourage you to roam about through the landscape and win a greater measure of health, relaxation and refreshment. On every walk you will draw strength from all you see, looking at it through Burroughs' keen, intelligent eyes. Nature invites you! Burroughs, your guide, awaits you, in his Nature Writings.

What a Bargain These Books Are!

John Burroughs would be happy to know that this fine edition puts his Nature Writings in reach of everybody. In life he made himself accessible to all, from President Roosevelt to dusty troops of boy scouts. He was beloved by the millions and by the millionaires, though only the latter could afford his sumptuous books—formerly! But now—you have an opportunity to obtain the complete 18 volumes of his Nature Writings, bound in forest-green linen in 9 handsome double-volumes, at about ONE QUARTER the former price. Instead of $45—only $13.85! EXAMINE THE COMPLETE SET AT OUR EXPENSE FOR 10 DAYS FREE!

HOW MANY OF NATURE'S FASCINATING SECRETS DO YOU UNDERSTAND?

What bird swims so well under water that he can capture even the wary trout?

What common animal has lost his protective coloration by changing his home from woods to the fields?

Which is the best concealed bird's nest in the woods?

Do bees ever carry stones for ballast on windy days?

What are the best times of day to foretell the next day's weather?

Why do white flowers have perfumes more often than colored ones?

Why do oaks and chestnuts spring up where a pine forest has been cut down?

What bird dives for fish and spears them with its long sharp bill?

What bird always lines its nest with the cast-off skin of a snake?

This Offer Not Good After June 30, 1932
Mail This Reservation TODAY!

WM. H. WISE & CO., Publishers
Dept. 76, 50 West 47th St., New York, N. Y.

Put aside for me a Gift Set of 3 Pocket Bird Guides with one green linen set of John Burroughs' Complete Nature Writings (18 volumes bound in 9 books). Notify me when they are ready to ship and I will send one dollar as a deposit. Ship them, charges prepaid, for 10 days' free examination. If I return them my deposit dollar is to be sent back to me at once. If I keep them it becomes my first payment and I send $3 per month until $13.85 total is paid. (Cash price $13.25.)

Name .....

Address .....

How An Amateur Pictured Marine Life

By Rudolph C. Lang

Photograph by Arthur J. Lang

Interesting and unusual photographs can be made of objects under water by means of a water glass. The water glass is a simple device, comprised of a conical tube (preferably of metal) open on the small end and fitted with a piece of clear glass on the other. As the tube is placed partially in the water all joints or seams must be made waterproof. Shellac has been found suitable for this purpose as it forms an excellent bond between glass and metal.

For those desiring an arrangement whereby the replacement of the glass may be easily done, screw fittings and rubber gaskets are suggested. Even this design is far less cumbersome and intricate to make and operate than a watertight box down below with a remote operating control.

As everyone knows, considerable visibility can be had in water, free from sediment, were it not for the reflection of light on its usually uneven surface. Even the slightest ripple causes sufficient light to be reflected into the eye or lens of the camera to prohibit the view of an object underneath.

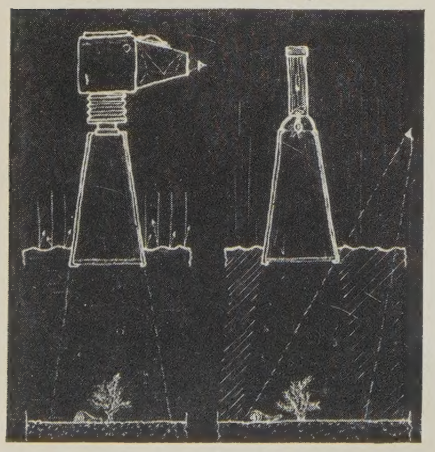
Figure 1 shows the specially constructed water glass in use. The reflected light rays are now excluded and that portion of the light which penetrated the water is left to illuminate the object. By placing the lens of the camera in the position formerly occupied by the eye, a permanent photographic record can be made.

Owing to the fact that all of the light does not reach the object, a trifle longer exposure is necessary. The depth at which pictures can be taken by this method is entirely dependent on the clarity of the water and the amount of light reaching the object.

Incidentally, it is interesting to note that this glass can be used for looking into water at night, by projecting a beam of light through the glass and observing the object from without. In this case there are no reflections other than that produced by the projected light and these are eliminated by passing through the flat surface formed by the glass in contact with the water. See Figure 2 and picture in lower right corner.

EDITOR'S NOTE: Do not the Photoflash and Photoflood Lamps present a light source for this kind of work at night? Has anyone tried them?

Fig. 1 Fig. 2



EDITED BY ROBERT T. LOWELL

The First Portrait

Descendant of pioneer in photography requests that impression given concerning maker of first portrait by photography be corrected.

Under the heading of "Photography's Advance" in the April issue, we mentioned that Samuel F. B. Morse brought the Daguerreotype picture formula to America and is credited with being the first to apply it to human portraiture.

On the same page was printed the picture that is reproduced below and beneath it was simply the caption, "First portrait made by photography." This picture, as the caption now points out was made in 1840 of Miss Dorothy C. Draper by her brother, Professor John W. Draper, and the original is now in the photographic archives of Sir William John Herschel of England.

We are indeed indebted to Miss H. M. Draper, the granddaughter of the author of this picture, for calling this matter to our attention.

THE EARLIEST SUNLIGHT PICTURE OF A HUMAN FACE

Miss Dorothy Catherine Draper, taken by her brother, Professor John William Draper, M.D., LL.D., of the University of the City of New York early in 1840

Contests

For Snapshooter and Movie Maker

A photo finishing association is offering $5,000 in cash prizes for pictures this summer. Details and entry blanks at most camera shops.

$1,000 in cash is offered to amateur movie makers by the magazine, "Amateur Cinematographer," 1222 Guarantee Building, Hollywood, California.

Competitions are good tonics—they make us strive for something different, something better than we've done before—and we *may* win an award.

100% Entertainment

A motion picture enthusiast received a high compliment the other night. He had put up his projector and was showing a reel of pictures made with his ciné camera before a home audience of old and young, of family and friends.

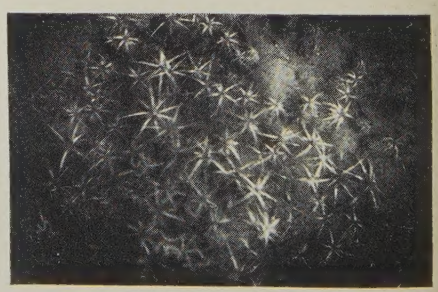
One of the visitors (he had his little daughter with him) said: "You have given us what I consider 100% entertainment, and I will tell you why I think so. Nothing in words can hold the attention of children *and* grown-ups alike. Nothing in music can hope to hold *all* ages and conditions. But pictures of friends in action, and in this case, *pictures of the children themselves,* are bound to score a hit. When I see myself on the silver screen, I'm bound to be attentive. Children as young as three or four are fascinated by pictures of themselves, and I have discovered that they never tire of seeing these pictures repeated. Pleasing them once would be worth the price. But I have never known a kid who wouldn't sit entranced any time he was called to see himself and his chums at play. This is why I say that a home-movie show can lead all forms of entertainment."

What a contrast to those early days of photography—we now press a button and we're making our own movies!

We Want to Assist

Since you first began making pictures you surely have found that as you have become more proficient you have become more particular about the quality of your work, and that pictures which you once thought perfect seem less so in the light of acquired knowledge. Do you know why they now do not wholly please you? It is because you have learned how to detect mistakes but have not yet learned how to wholly avoid or correct them.

Do you wish us to help you? Would you care to have us criticise your photographs? If so, send us the prints, together with the negatives from which they were made, stating the name of the camera, and, if you did the finishing yourself, give the name and grade of the paper used for making the prints, whether the negatives were developed in the tank or in the tray, the time of day the pictures were made, the light conditions prevailing when the exposure was made, the stop used and the exposure given; then we will gladly write you our opinion and will try to assist you in becoming still more proficient in your work. The negatives and prints will be returned promptly with our opinions. Address: Editor Photographic Department, Nature Magazine, Washington, D. C. If you haven't all the data send them anyhow.



Plant Life: Bottom Lake George

NATURE IN PRINT

Snow Crystals

Many lovers of the beautiful in Nature occasionally have seen a few of the exquisite snow jewels that drift down out of the skies when the clouds are right and the weather cold. How often, too, we have wished that these gems of rarest pattern somehow could be made conveniently large, and then so preserved that we could revel in their aesthetic delights while also enjoying the comfort of the fireside, or ease of the summer porch! And now this dream of the seemingly impossible has come true. Wilson Alwyn Bentley, the kindly "snowflake man" of Jericho, Vermont, studied and photographed the snow crystal through a microscope for nearly fifty years and thereby preserved for us thousands of its finest forms—no two alike. From his cold work came first exquisite pictures of the snow crystal, selections from which have adorned many a book and magazine, and guided many an artist in the production of dainty designs.

But all the snow-crystal pictures thus made available were scarcely more than random samples from the multitude in Mr. Bentley's growing museum. And so from the ends of the Earth there came insistent appeals that not some only, but every one, of the many hundreds of his finer snow-crystal pictures be made available. A difficult task indeed, and expensive, but at last fully completed in the form of a book, "Snow Crystals", containing nearly 2500 pictures, mostly of the snow crystal, from the simplest to the most intricate, and also a few of frost on the windowpane, dew and other interesting forms of water. In addition, there are adequate descriptions and explanations by Dr. W. J. Humphreys of the U. S. Weather Bureau. Finally the publishers, the McGraw-Hill Book Co. of New York City, are to be congratulated on making this book, in every particular, form, size and quality of material, worthy of its contents—a picture book par excellence of Nature in one of her daintiest moods. A fitting monument it is to the patient work of a lifetime, and truly a monument, for after a bare three weeks of happiness over its completion there ended forever the drama of the kindly "snowflake man" whose love and labor it embodies.

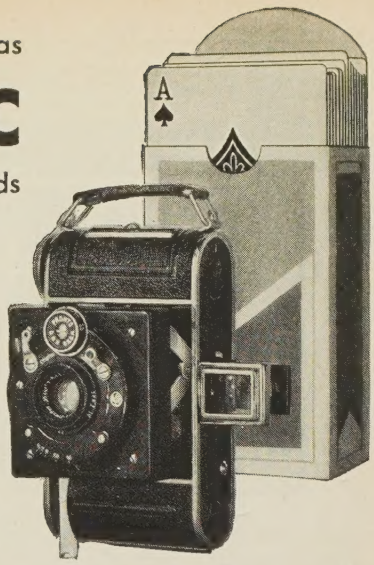
British Birds

Apparently Allen W. Seaby has spent much of his life observing birds and has gone to many of the outlying parts of Britain to do this. So, in *The Birds of the Air,* he tells of them in an informal narrative style distinctly removed from the usual more formal style of classification and scientific description. The net result is a book that is a sort of chat between one bird lover and another, the latter being the reader. Mr. Seaby has illuminated his text with many illustrations from his own pen. The book is distributed in this country by The Macmillan Company for $2.25.

The **ACE** of vest-pocket cameras

PICCO CHIC

no larger than a deck of cards



The most remarkable Value in Miniature Rollfilm Cameras

Takes SIXTEEN needle-sharp pictures, 1 3/16 x 1 9/16 inches, on REGULAR 8-exposure, vest-pocket film.

Fully corrected VIDAR anastigmat lens, F:4.5, focal length 2", in reliable PRONTO shutter, with Time and Bulb exposure and 1/25, 1/50, 1/100 speeds, and built-in, delayed-action SELF TIMER.

Focusing for near distances by front-lens rotation.

Leather-covered, all-metal camera casing, with moulded, highly nickeled edges. Pressure on a little button brings the camera into correct position and focus, for instant use. The large, optical, double-unit Finder opens automatically with the camera. A spring-pressure-plate in back of camera holds the film securely in focal plane.

Dimensions over all 2 3/8" x 4 1/4" x 1".

Price includes a fine silk neck-cord and a soft leather pouch for the camera as well as a cable release.

$12.50

With Trioplan F 3.5 Lens in Ibsor Shutter. . . **$20.00**

With Vidar F 2.9 Lens in Compur Shutter. . **$30.00**

With Schneider Xenar F 2.9 Lens in Compur Shutter and Helical Focusing Mount. . . **$37.50**

Send for FREE booklet N.M.P.

WILLOUGHBYS

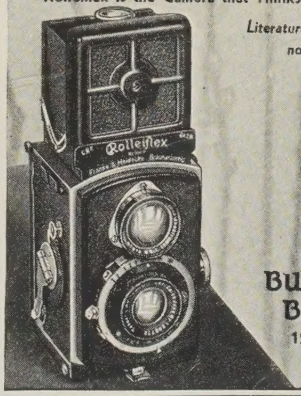
110 WEST 32ND STREET, NEW YORK CITY

Established 1899

Rolleiflex

• Combining the simplicity and operating economy of the Roll-film type with the accuracy of a Reflex, Rolleiflex represents the greatest advance in camera construction. A high-speed, focusing finder lens projects a brilliant image — full film size and right side up — on a ground glass screen, indicating, even thruout exposure, the sharpness you will obtain on your negative and affording you visual evidence of your subject's pictorial qualities. . . . . Truly, Rolleiflex is the Camera that Thinks for you.

Literature on New Models now available.

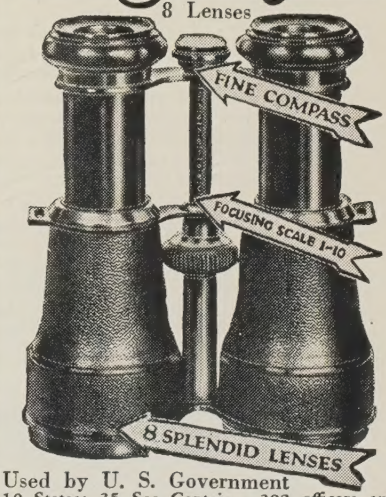


BURLEIGH BROOKS

127 West 42d St.
New York

Magic Eyes

8 Lenses



Used by U. S. Government
10 States; 35 Sea Captains; 392 officers and employees of navigation companies; 96 Army, 45 Naval Officers; U. S. Coast Guard; etc.

FREE TRIAL

Send for these 8 lens galilean DAY AND NIGHT binoculars for free trial. They give you MAGIC EYES that conquer distance, bringing far away objects before your very eyes. So powerful you can count high tension wires on hill top 2 miles away. Wonderful for touring, vacations, all sports, nature study, hunting, etc. EIGHT fine lenses give crisp, clear-cut detail, expansive field, and great range. Only 4 3/8 inches high. Fine compass on top. Graduated focusing scale 1 to 10 on middle bar. Case and straps included free. The list of users above speaks more for the glass than we could. They need and demand good glasses. However, try them yourself.

SEND NO MONEY

Send for a pair today. No money down. See—try—compare. Give them every possible test. If, at the end of five days you care to part with them return them, otherwise send us $7.95 in full. Or, 5% discount for cash with order. Satisfaction guaranteed or money back. Remember you buy direct.

DuMAURIER CO., Dept. 86, Elmira, N. Y.

MIRAKEL

OPT. CO. DAYLUX BINOCULAR

POCKET PRISM NATURE GLASSES

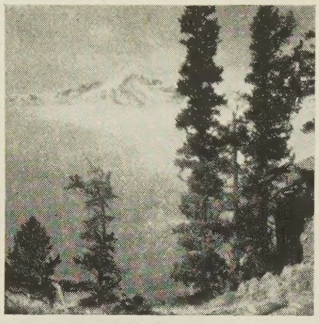
3½ power $13 to $18; 5 power $13 to $17; 6 power $16.50 to $20; 7 power $19.50 to $35; 8 power $18.50 to $37.50. Sent on approval, post paid. We carry everything in new and used glasses. Catalogue free. What have you to exchange?

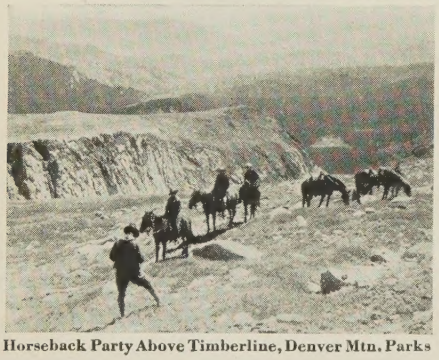
J. Alden Loring Box K-2 **Owego, N.Y.**

Let the Photographic Editor Help You.

COLORFUL COLORADO

Pikes Peak, the "World's Most Famous Mountain," Can Be Climbed by Automobile on a Safe, Easy Road

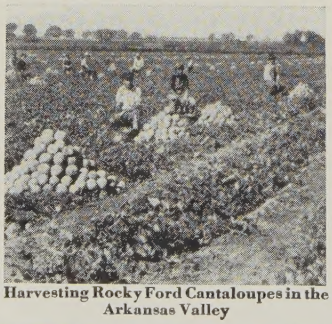




Horseback Party Above Timberline, Denver Mtn. Parks

More Vitamins
More Ultra-Violet
More and Better Fun!

Cool nights, mineral soil and constant sunshine in clear, clean, rare air impart extra vitamins and richer flavor to all growing foods (for man or meat) in Colorado. The sun gives you more violet rays in winter than you get elsewhere in summer! Add to that the gorgeous scenery of infinite variety; the perpetual temptation to stay outdoors and play; the business opportunities of unlimited natural resources. Colorado is the place for happy, successful living! See for yourself on your next vacation —you can see more, do more, play more in a shorter time at less cost in Colorado!



Harvesting Rocky Ford Cantaloupes in the Arkansas Valley

THE KEY STATE

OF THE NEW WEST

The Colorado Association
1046 Kit Carson Bldg., Denver, Col.

Send me FREE book, "Colorful Colorado: Opportunity's Playground," illustrated with natural-color photographs.

Name_____

Address_____

The Charm of Old French Canada awaits you on the Gaspe Coast

Leisurely refreshing 9 to 14 Day cruises on excellent steamers from Montreal through the St. Lawrence Waterway to Gaspe, Prince Edward Island, Newfoundland, little known Labrador, the North Shore, and the famous Saguenay.

Ask your travel bureau for illustrated booklet or write

CLARKE STEAMSHIP COMPANY, LTD.
19Q DOMINION SQUARE BLDG., MONTREAL
All fares payable in Canadian Funds

Florida Bird Life

We have just received from the publishers agents Coward-McCann, Inc., 425 Fourth Ave., New York, *Florida Bird Life* by Arthur H. Howell. The history of bird life in Florida extends back to 1562 and to Mr. Howell has come the opportunity to present it all to us in collected form adequate and authoritative. The volume before us has been based upon investigations carried on both in winter and in summer over a period of twelve years, with the generous help of other scientists and a thorough knowledge of all available sources of information, much of which is as yet unpublished and, therefore, new.

With a touch of the Tropics at its southern end, the peninsula of Florida is the home of many birds not found elsewhere in this country. It is also the highway for numerous species of migrating birds so that the book has a general as well as ornithological interest.

The thirty-seven color plates by Francis L. Jaques of the American Museum Staff, who at this date is second to none in the picturing of bird life, greatly enhances the beauty value and attractiveness of this admirable volume.

The United States Biological Survey, where Mr. Howell is a Senior Biologist, cooperated with the Florida Department of Game and Fresh Water Fish to forward the tremendous task of gathering the data. The publishing was made possible at this early date by the timely assistance of Mrs. Marcia Brady Tucker of New York, and we appreciate most heartily Mrs. Tucker's aid in bringing us to this wonderful volume. It is well worth the price of $6.00. R. B. H.

Ohio Game Birds

Discussion of the winter care of game and song birds in Ohio is contained in a bulletin recently issued by Bureau of Scientific Research, Division of Conservation of the Ohio Department of Agriculture. The bulletin is the work of Lawrence E. Hicks, research ornithologist, and is entitled *Ohio Game and Song Birds in Winter*. Attention is given to the most effective methods of emergency feeding; the best foods to plant; habitat; enemies of birds (except man); and sanctuaries. The section of conservation points out why the usual sanctuary leaves much to be desired on account of the tendency to clean it up to the point that the inhabitants may be observed by humans. The bulletin lists all birds recorded in Ohio in winter. R. B. H.

The Cactus Garden

Timely in view of the increasing interest in gardening with cactuses is *Cactus Culture* by Ellen D. Schulz, director of the Witte Memorial Museum at San Antonio, Texas. The author treats with the various species of cactuses, how to start such a garden, the problems of indoor and outdoor gardens and other pertinent details, concluding with a chapter on insects and diseases. The book is at once of use to the beginner in cactus gardening and suggestive to the more experienced grower. It is published by the Orange Judd Publishing Company, 15 East 26th St., New York City and sells for two dollars.

For the Gardener

Another excellent book for the home gardener is added to the already considerable and varied list available from numerous publishers. There must be a demand for such volumes or publishers would not continue to undertake them, we suppose, and the Orange Judd Publishing Company is certainly warranted in adding to existing garden literature by bringing out *Planning and Planting the Home Garden* by Pauline Murray. This is a thoroughgoing book, being both practical and complete. The author writes as much for the home-owner with a small garden as for the fortunate one with a large space to develop. She has done an excellent job and the book is recommended to gardeners. It sells for $3.50.

Ranger Naturalist with Trail Party in Bryce Canyon

Take a Tip from the Field Department of NATURE MAGAZINE for your 1932 Summer Vacation

Get 'Way Off the Beaten Path

on one of these unusual travel tours to the most colorful scenic regions on the continent, including

Zion-Grand Canyon-Bryce Canyon National Parks and Cedar Breaks

For the benefit of its readers and their friends, Nature Magazine has arranged for these 1932 Field Trips to be conducted by the Union Pacific on the same plan as the vacation trips of former years, the parties leaving Chicago on

July 17th, July 31st and August 14th

for a leisurely trip thru the Utah-Arizona Wonderlands.

The parties will be personally conducted and all-expense . . . costs being substantially lower.

• • •

If the dates named are not suitable, others are available . . . or we shall be pleased to help you plan an independent trip of similar character.

The coupon below is your key to prompt and detailed information.

UNION PACIFIC SYSTEM — THE OVERLAND ROUTE

Not a Dull Moment

Zion, with its great gorge and friendly atmosphere . . . stupendous Grand Canyon, an epic of erosion . . . incredible Bryce with its flaming spires and grotesque formations. Miles of matchless trails . . . wild life galore . . . ranger naturalists to lead you "off the beaten path" and to assist in detailed study of these regions.

• • •

Crowded hours of carefully planned pleasure await you on these 1932 field trips via

THE OVERLAND ROUTE

UNION PACIFIC

Mr. J. P. Cummins, General Passenger Agent
Union Pacific System
1416 Dodge Street, Omaha, Nebr. Date _____

☐ Please send, without obligation, complete information and literature about Field Trip sponsored by Nature Magazine.

I am interested in independent trip to _____,

and would like to spend about _____ days, at a cost not to exceed $ _____

Name _____ Phone _____

Address _____

Writing

a source of income that many people neglect

MANY people who *should* be writing never even try it because they just can't picture themselves making "big money." They are so awe-struck by the fabulous stories about millionaire authors that they overlook the fact that $25, $50 and $100 or more can often be earned for material that takes little time to write—stories, articles on home or business management, sports, travels, recipes, etc.—things that can be easily and naturally written, in spare time.

Mrs. E. Gladys Stone, R. R. 6, Muscatine, Iowa, is but one of many men and women trained by the Newspaper Institute of America to make their gift for writing pay prompt dividends. She writes:

"After the good foundation the N.I.A. has given me, I should have enough backbone to get out now and make some use of my training. And I am, in a way. I have sold ten children's stories and two short articles to magazines."

Another of our student-members who tried is Dr. Benjamin B. Milnes, 2620 Main St., Buffalo, N. Y. He writes:

"I believe I owe a great deal to the Newspaper Institute, for without the training you so conscientiously equipped me with I would not now be able to say: 'Here it is—the first one.' I am mailing you, today, a copy of my first novel, 'Hungry Hollow.'"

You, too, can learn to write! How? By WRITING!

The Newspaper Institute of America offers an intimate course in practical writing—a course as free from academic "isms" and "ologies" as a newspaper office—a course as *modern* as the latest edition of this morning's paper.

Week by week, you receive actual assignments—just as if you were right at work on a great metropolitan daily. Your writing is *individually* corrected and constructively criticized. A group of men with 182 years of newspaper experience behind them are responsible for this instruction. Under such sympathetic guidance, you will find that (instead of vainly trying to copy someone else's writing tricks) you are rapidly developing your own distinctive, self-flavored style. You are learning to write by writing—acquiring the same experience to which nearly all well-known writers of short-stories, novels, magazine articles, etc., attribute their success.

How you start

To insure prospective student-members against wasting their time and money, we have prepared a unique Writing Aptitude Test. This tells you whether you possess the fundamental qualities necessary to successful writing—acute observation, dramatic instinct, creative imagination, etc. You'll enjoy this test. Newspaper Institute of America, 1776 Broadway, New York.

Newspaper Institute of America
1776 Broadway, New York

Send me your free *Writing Aptitude Test* and further information on writing for profit, as promised in Nature Magazine—June.

Mr. }
Mrs. } .....
Miss }

Address.....

(All correspondence confidential. No salesmen will call on you.) 87F262

Why don't you write?

The City Sleeps....

and you sleep like an innocent child when you stop at Hotel Harrison, Chicago's newest and finest downtown hotel.

In the center of Chicago's famous hotel district just off Michigan Boulevard.

Every room with private bath or shower. Radio loud speaker, circulating ice water—these and countless other luxuries are yours at only —

SINGLE $2.50 & $3.00 WITH BATH
NO HIGHER

Twin-Bed Rooms — $4.50 — $5.00

HARRISON PARKING GARAGE IN DIRECT CONNECTION

HOTEL HARRISON

HARRISON STREET NEAR MICHIGAN AVENUE

CHICAGO

ILLUSTRATED FOLDER SENT ON REQUEST

Ornithological Nomenclature

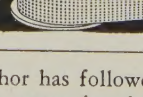
Many a potential bird-student took up fishing after his first struggle with the scientific names of birds. Perhaps more of them would have persevered had there been in existence a volume such as that recently issued by Mary Ferguson Coble and Cora Smith Life. Its title is *Introduction to Ornithological Nomenclature,* and its purpose is to explain and teach the pronunciation and derivation of the multi-syllabled words with which the birds have been tagged. A presentation of the groups under which these names naturally fall —the structural characters, color, markings, habitat, characterizations, etc.—affords the student an opportunity to learn considerable about a bird just from its name. Birds native to the West and those that appear as migrant visitors there are included in the volume. The little volume, priced at $1 at the Wm. B. Straube Printing Co., Los Angeles, is indeed a real contribution to bird literature.

On Plant Life

It is an interesting objective that A. C. Seward sets for himself in writing *Plants: What They Are and What They Do,* just published in this country by the Macmillan Company. The author, who is Professor of Botany at Cambridge University, England, writes for those whose school work has been classical rather than scientific, and seeks to introduce them, as he says, "to some of the more striking attributes of the humbler organisms in order that they may be in a better position to appreciate what the world owes to plants". His fundamental aim is to awaken in laymen an interest in some of the basic principles of biology. The author has followed with care and thought the course he charts for himself and the result is wholly satisfactory. Necessarily it is a nibble at the edge of things but it does invite a larger bite. This little book is listed at $1.50.

Callouses
Gently Fade Away

The torturous pains of Corns and Callouses yield in a few seconds to the wonderful medication in this thin, comfortable adhesive fabric. You walk, play, dance, in comfort. No more nagging pains or tired, aching, burning feet. **Medicated Adhesive Tape** quiets the inflamed nerves and absorbs all hard growths without injury to healthy flesh. Antiseptic, healing. Big spool. 60 square inches. Send $1, and if not satisfied after trying, get full refund. **Comfitape Laboratory, Box 10, Burlington, Vt.**



MEDICATED Comfitape

"Nature" readers specified these trips

Independent pack trips and all-expense camping tours into the wilds of Yosemite National Park.

Go Southern Pacific—Low summer roundtrip fares now in effect

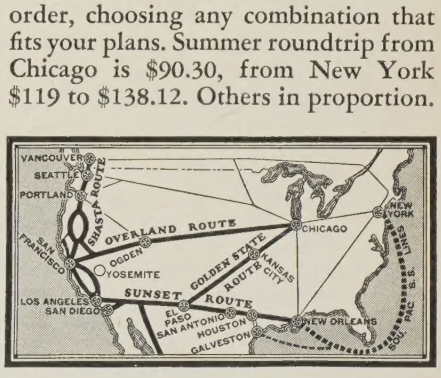
TO SATISFY the demand of "Nature" readers for trips that wander off the beaten path and seek out *nature,* Yosemite has created new kinds of camping trips . . . trips that open up more than a thousand square miles of virgin High Sierra mountain country—towering granite peaks, breathless canyons, living glaciers, alpine meadows, crystal streams. A region where grazing and hunting are prohibited, and wild flowers, shrubs and animals still live in their natural state.

All-expense camping tours. Complete outfits are made up to order for trips of any length. Guides, packers, cooks, pack and saddle animals, provisions, canvas shelter and bedding are furnished. Specify number in party and probable number of days.

Saddle trips. All expenses for three days as low as $22.50. Guide, saddle animals, meals and dormitory tent accommodations in High Sierra camps are included.

Automobile tours. All-expense tours from Merced on the Southern Pacific Railroad. Two-day tour, $19.50 and up. Longer tours in proportion. State accommodations desired.

Southern Pacific's Four Great Routes offer a unique advantage in a trip to California and Yosemite. Study the map. Note how you can go direct to Los Angeles on the *Golden State* or *Sunset Routes* (stopover in Southern California if you wish) and on to Yosemite. Thence to San Francisco, where you can choose between *Shasta Route* thru the Pacific Northwest or the *Overland Route* direct to Chicago. Or, from Yosemite, take the thrilling Tioga Pass Tour along the High Sierra's crest to Lake Tahoe where you meet the trains of the *Overland Route.* Or reverse the order, choosing any combination that fits your plans. Summer roundtrip from Chicago is $90.30, from New York $119 to $138.12. Others in proportion.



Southern Pacific

YOSEMITE PARK AND CURRY CO.

SOUTHERN PACIFIC-YOSEMITE TRIPS
310 South Michigan Boulevard, Chicago, Ill., or 531 Fifth Ave., New York.

Please send me complete information on a Yosemite camping trip [ ] Auto Tour [ ]. I wish to spend [ ] days in the park. There will be [ ] persons in my party. I wish to join a party of "Nature" readers if possible [ ].

Name Address

NATURE MAGAZINE

PUBLISHED BY THE AMERICAN NATURE ASSOCIATION

To Stimulate Public Interest in Every Phase of Nature and the Out-Of-Doors, and Devoted to the Practical Conservation of the Great Natural Resources of America

CONTENTS FOR JUNE · 1932

Photographic Department . . . . Robert T. Lowell 11
The Horned Owl . . . . . Samuel Scoville, Jr. 339
Why Veronica Is So Named . . Albert A. Hansen 342
Cherokee Plant Lore of the Smokies
Robert Lindsay Mason 343
Burs of Common Plants
Salome Comstock-Miller 347
Sixteen Million Washington Trees
Charles Lathrop Pack 348
About a White Pelican . . . . Marjorie Shanafelt 349
Why They Survive . . . . . Paul Griswold Howes 351
Lore of the Oriole . . . William Atherton Du Puy 352
Teasel as a Decoration . . . . Anne Belle Loken 354
Ant-Lions and Pit-Falls . . . . . A. B. Champlain 355
Topography in the Making . . . . . H. J. Lutz 356
Golfers Raise Own "Birdies"
Richard W. Westwood 360
The Western Cottonwood . . . . Mary E. Towne 361
A Forest Hobby . . . . . Burton Baron Colmar 362
Juan's Pet . . . . . D. C. Retsloff 363
Pholas, the Artisan Anchorite
Ben Hur Lampman 364
An Afflicted White Oak . . . . . W. E. Tharp 365
The Blue Grouse of Monumental
James W. Marten 366
All for a Flower . . . . . Ralph Krows 367
Gems of June . . . . . August Pohndorf, Jr. 368
Balsam of Peru . . . . . Gretchen Smith 369
How the Stars Are Counted . . . Isabel M. Lewis 370
A Sad Case of Indigestion . . Charles T. Vorhies 372
Index to Vol. 19 382

ORGANIZATION

THE MAGAZINE

PERCIVAL S. RIDSDALE . . . . . Managing Editor

ARTHUR NEWTON PACK . . . . . Associate Editor

RICHARD W. WESTWOOD . . Chief, Editorial Staff

R. BRUCE HORSFALL . . . . . Artist

EDWARD A. PREBLE . . . . . Consulting Naturalist

HARRY E. RADCLIFFE . . . . . Business Manager

THE ASSOCIATION

ARTHUR NEWTON PACK
President
Princeton, N. J.

CHARLES LATHROP PACK
Chairman Board of Directors
Lakewood, N. J.

PERCIVAL S. RIDSDALE
Secretary-Treasurer
Washington, D. C.

RICHARD W. WESTWOOD
Assistant Secretary
Washington, D. C.

HARRY E. RADCLIFFE
Business Manager
Washington, D. C.

WILLIAM L. FINLEY
Director, Wild Life Conservation
Jennings Lodge, Ore.

DR. E. LAURENCE PALMER
Director, Nature Education
Cornell University, New York

RUSSELL T. EDWARDS
Director, Educational Publicity
Washington, D. C.

SCIENTIFIC CONSULTING BOARD

DR. LELAND O. HOWARD — Principal Entomologist, U. S. Bureau of Entomology
DR. WALDO L. SCHMITT — Curator of Marine Invertebrates, U. S. National Museum
DR. HARRY C. OBERHOLSER — Biologist, U. S. Biological Survey
HENRY O'MALLEY — U. S. Commissioner of Fisheries
C. W. GILMORE — Curator of Vertebrate Paleontology, U. S. National Museum
VERNON BAILEY — Chief Field Naturalist, U. S. Biological Survey
DR. PAUL BARTSCH — Curator of Mollusks, U. S. National Museum
DR. EDGAR T. WHERRY — Wild Flower Preservation Society
DR. T. GILBERT PEARSON — National Association Audubon Societies
DR. WILLIAM M. MANN — Director, National Zoological Park

NATURE MAGAZINE, PAST AND PRESENT, IS INDEXED IN THE READER'S GUIDE IN YOUR LIBRARY

NATURE MAGAZINE is published monthly by the American Nature Association. Entered as second-class matter May 31, 1927, at the post office at Washington, D. C. Additional entry at Greenwich, Conn.

Publication and Editorial Office, 1214 16th Street N. W., Washington, D. C. Additional Offices of Publication, Greenwich, Conn.

ONE YEAR $3
FOREIGN . . . $1 EXTRA
TWO YEARS $5
LIFE MEMBERSHIP $100

A. B. McClanahan, Advertising Manager

ADVERTISING OFFICES
New York—Graybar Building
Washington, D. C.—1214 16th St.
Chicago—360 N. Michigan Ave.
San Francisco—304 Merchants Exchange Bldg.

Copyright, 1932, by American Nature Association

Title Registered U. S. Patent Office

THE APPEAL OF BOBWHITE

• • •

Whose Cheery Call is Missed by Bird Lovers

As YOU read these lines the voice of Bobwhite will ring from the meadows and pastures on thousands of American farms. It is a cheery call, suggestive of wind-rippled grain, and daisy-flecked fields that slope down to the meadows where bobolinks hover and sing; of weedy fallows stretching back to patches of white-bloomed blackberry vines; of winding roads bordered by zig-zag lines of old rail fence half hidden under festooned ivy and woodbine. The housewife at her tasks likes to hear the cheery greeting; the farmer knows that presently Bobwhite will hop down from his singing post and resume his insect-hunting patrol; the boy has visions of hunting for the grass-thatched nest with its store of pointed eggs.

Fifty years ago, from the latitude of southern New England to the Gulf, and west to the middle of the Great Plains, excepting the forested highlands, one could scarcely escape the sound of Bobwhite's call in June. But many have noticed that we now hear less and less frequently his clear greeting. We miss the sweet-voiced messenger of June, and wish that he might again bless us with his old-time abundance.

Now we all know that the growth of cities banishes many birds, but we should not forget that moderate settlement makes better homes for many species, and the quail is one of them. There can be little doubt that Bobwhite increased when clearings and cultivated fields came to his primitive home. At any rate, fifty or sixty years ago found his tribe numerous on the plantations within his habitat. Since then his decline has been rapid. Many minor causes have contributed, but the main one is the gun.

In the days of the muzzle-loader destruction of small game was relatively trifling, chiefly because few people hunted. Still we read of as many as sixty quail being killed in a day by one gun. But the widespread use of the modern breech loader that soon followed told a different story. A few years ago in these pages, a South Carolina writer stated that in the late eighties he killed from three thousand to forty-five hundred quail a season. Farther north the Bobwhite had already become scarce. This led to the dream of restocking. The still abundant quail population of Virginia, the Carolinas, Georgia, Tennessee, Oklahoma, Kansas, Texas and Mexico were successively drawn upon in vain attempts to replenish the shot-out coverts of the middle, and, later, the southern states. In the aggregate, many thousands of the birds have been moved, but no state within the bird's original range has benefited. In general, importations from southern ranges have weakened the stocks of northern birds, and in some sections along the northern borders of the bird's habitat the native stock has become so diluted that it has not the strength to reoccupy the original range, even under protection.

But the true friends of Bobwhite mourn his decline, and wish again to hear his merry whistle in the meadow lot. How may this come about? Merely by protecting him from the gun in places where he can get his natural winter food. Careful studies of covies wintering where they were subjected to severe climatic conditions have shown almost no losses from predatory enemies among birds that frequented places where shelter and abundant food was available. Ohio gave complete protection to Bobwhite in 1915, by removing him from the list of birds that could be shot as game. Many interested in killing the bird for sport prophesied his rapid decline, on the ground that the solicitous interest of the gunner in its welfare would be removed. But Bobwhite responded nobly, and many disinterested observers each year publish notes proving that he has registered an increase of several hundred percent during the period that he has enjoyed respite from the gun. Many who have opposed this move have derisively called it "putting the quail on the song bird list". Those who have listened to the sweet conversational notes used by the devoted pair when they are leading about their tender young, or have heard the awakening covies greeting each other across the fields in the dewy morn, are willing to class the sweet notes as a form of singing, though the desire to protect the gentle bird from annihilation springs from a broader appreciation of its charms. Furthermore, the farmers of Ohio, deeply sensible of his value to agriculture, played no minor part in the efforts that resulted so favorably for Bobwhite, and they have not been found wanting when successive attempts to doom the bird have demanded a rallying of forces to his defence.

Ohio's example has been followed by a few other states, and all those bird-lovers who wish their children to hear the quail's merry whistle in June's bright days may well take heed. But friends of the bird must realize that only by militant measures may such priceless treasures be saved from a relentless industrialism that for temporary gain is willing to sacrifice forever even the gems of God's handiwork.

"LIKE A FLASH OF DARKNESS THE GREAT OWL SHOT
DOWN TOWARD THE UNCONCERNED SKUNK"

NATURE MAGAZINE

VOLUME 19 JUNE · 1932 NUMBER 6

THE HORNED OWL

BY SAMUEL SCOVILLE, JR.

ILLUSTRATED BY R. BRUCE HORSFALL

IN THE west the afterglow still barred the violet dark which flowed like a flood across the Barrens. One by one the pitch pines, marching in somber rows across the white sand, were blotted out. As the last gleam of sunset faded, there came a sudden brightness in the east, and a rim of raw gold showed above the edge of the world. For an instant, that lonely wasteland lay still as sleep. Then, as the full moon climbed the sky, from far-away bogs and gold-green pools came the clear voices of the hylas, like tangled chimes of tiny silver bells, while in the wet thickets wood frogs clattered and quacked and honked. Abruptly, at the edge of a clearing, from shadows black as spilled ink, pealed the strange song of the whippoorwill. Over and over and over again the night bird repeated his tripled notes, with a little click between each one, hurrying as if he feared to be interrupted before he could finish.

"THE NEXT INSTANT A GREAT OWL, SOME TWO FEET HIGH, SAT PERCHED ON A DEAD LIMB"

As the wild, sweet melody thrilled through the dark, it seemed as if the moonlight itself had been set to music. Then, in the very middle of a note, the singer stopped, as in the distance sounded the ghostly call of the great horned owl—"Whoo, hoo, hoo, hoo, hoo." Although it was faint and far away, an indescribable menace seemed to thrill through every syllable of the weird notes. A few moments later, across the moonlight drifted a shadow from whose depths two dreadful eyes flared like fire. It followed the windings of the silent stream, stained and dyed by a million cedar roots, and vanished in the branches of a sweet gum which overhung the water. The next instant a great owl, some two feet high, sat perched on a dead limb. Its plumage was a blending of black and gray and tawny, with a broad white collar, while an angle of black feathers on its forehead gave a scowling effect to the bird's glaring

eyes. At the bottom of a large hole in the tree trunk her mate brooded two white eggs the size of a hen's egg but nearly round. These were her second clutch. Her first had been laid in the snow and sleet of January, on the bleak shore of Delaware Bay. There, in an osprey's nest, a cart-load of sticks set in the top of a dead tree, she had started housekeeping. The March before, a bald eagle had occupied the nest and in May its real owner, the osprey, had come back there and laid four cream-colored eggs, all blotched with chocolate and purple brown. It may have been that three different householders in less than a year were too much for the long-suffering tree. At any rate, in a February gale it went down with a crash, nearly engulfing the owls in the wreck. Escaping just in time, they had flitted like shadows through the storm and made a new home, far from the sea, in the heart of the Barrens.

Tonight, the female, the larger and more savage of the two, left her eggs as her mate arrived, to winnow the Barrens for the food which her fierce blood craved. Like a shadow of death she drifted above the tree-tops, her ear-tufts showing like horns, while her broad wings muffled with soft down were noiseless. For a time there was no sign nor sound of life which the sharp sight and microphonic ears of the horned bird could detect. Then, as she crossed a little clearing in the woods hemmed in by thickets of scrub oak, she opened her hooked beak and gave the same menacing hoot which had shuddered through the air a few minutes before. At the sudden sound, two rabbits which had frozen in their tracks at the first sight of the ominous shadow gliding over the ground, leaped high into the air and darted toward a tangle of green thorn. If they had kept still, not even the vast black pupils of the owl's eyes would have seen them. Like the flicker of the shadow of a wind-tossed branch the bird swooped. Only the rabbits' nearness to the thicket saved them. As it was, the powder puff of the hindmost of the two disappeared among the vines just as the crooked talons of the owl gripped the empty air behind it. Snapping her beak angrily, she curved up above the trees again and continued her hunting.

Half a mile beyond where the rabbits had been, the grim huntress spied another possible victim. This time it was a black-and-white animal with a flaunting bushy tail, of a breed which she had never chanced to meet before. The stranger did not crouch and hide and run as the rabbits had done, but unconcernedly dug grubs out of a dead log, for the American skunk fears neither man nor beast nor bird. Its motto is: "Don't hurry; others will." A million years before the World War it learned the secret of the gas-attack. Like a flash of darkness the great owl shot down toward the unconcerned skunk. Swift as

"THEN, WITH A POUNCE LIKE THE UNCOILING OF A SPRING, THE OWL'S LEFT FOOT RIPPED THROUGH THE WATER AND CLAMPED ITS CLAWS DEEP INTO THE ROUND, SMOOTH BACK OF THE FISH"

was her swoop, the animal's defense was swifter. Bending like a bow, just as the great talons were about to sink deep into its fur, the skunk compressed the mat of powerful muscles which encircled two conical glands beneath its bushy tail. Instantly there shot upward a cloud of corrosive gas, choking as the raw fumes of ammonia. In an instant the owl's eyes were blinded and her lungs strangled by the deadly vapor. Checking herself in mid-air, she retreated, gasping and squawking. Its enemy driven away, the skunk calmly went on digging for grubs. Great horned owls were nothing in its young life.

Up and up the baffled bird soared, until the pure sky air drove out from her lungs the last trace of the choking fumes, although her feathers would for many a long day bear the sign and scent of her defeat. High above the earth, like a huge moth, she drifted toward where the lamplight of a farmhouse showed warm against the black cedars. As she neared the place, her keen ears caught the sleepy note of a turkey hen who had persisted in roosting on a tree instead of in the barn. As the independent fowl settled down to sleep, a dark figure suddenly appeared on the limb beside her, and when she drew her head out from under her wing she looked directly into a pair of baleful eyes. With a sharp "quit" the turkey moved away from the menacing bulk, only to find the dreadful stranger again close beside her the next moment. Inch by inch, she was edged clear to the end of the branch, until with a frightened squawk she fell flapping into the air, protected no longer by the over-hanging boughs. Before she could reach the ground, the fierce bird was upon her, and her life went out under the owl's cruel claws. Then, turning back the feathers of the fowl's breast, the owl skinned it as neatly with her crooked beak as a man could with a knife, and came back to her nest full-fed.

"THE NEXT INSTANT THE SNAKE'S BROWN-AND-WHITE BODY WAS WRITHING IN THE OWL'S PUNISHING TALONS"

A few days after the raid on the farm yard there came one of those sudden hot days which are found in every spring. Little waves of heat, heavy with the scent of white azalea, and the perfume from the white bells of the cassandra, eddied through the air. The brooding owl, in her winter coat of feathers, gasped for breath as the temperature within the gum-tree rose steadily. At last she could bear it no longer. Warning her mate in a near-by tree, with a sepulchral double hoot, to watch the nest, she flew down the stream half-hidden by overhanging boughs until she reached a tiny "sprung" as the Pinies call a concealed cove. There, in the dusk of the drooping trees, she alighted on the white sand which ringed a pool of smoky cedar water and stared inscrutably into its depths.

Fifteen minutes passed, and still the great bird sat like a brown stump by the water's edge, and only the flare of her molten-gold eyes showed the fierce life which throbbed within. At last, as if called by the spell of that fixed gaze, a large catfish rose through the brown water, keeping close to the sandy bank as it searched for the tiny insects and crustacea on which it fed. Slowly as the minute hand of a clock, the black body floated upward until it was scarcely six inches below the surface. Then, with a pounce like the uncoiling of a spring, the owl's left foot ripped through the water and clamped its claws deep into the round, smooth back of the fish. Shedding its sluggishness like a mask, the black swimmer struggled desperately, lashing the water with its long, smooth tail, while its enormous mouth fringed with streamers opened and closed. Flapping her wings, the owl tugged with all her sinewy strength, and, little by little, raised the struggling bulk out of the water and dragged it across the sand into a thicket, where she feasted.

While she was thus pleasurably engaged, for the first

time since the owl pair had come to the Barrens their castle in the tree-top was threatened. Aroused by the early and unusual heat, a seven-foot pine snake, all cream-white and umber-brown, wound its way among the thickets on a still-hunt for food. Each of its scales was ridged, giving a rough finish to its long body, unlike the smooth skins of the king snake and blacksnake, the two other larger serpents of the Barrens. As the pine snake's great bulk flowed over the sand, its golden eyes, set in a long, pointed head, gleamed like jewels. When it reached the foot of the owl-tree, it seemed to sense the presence, high above it, of a nest of eggs—the most prized food on a pine snake's menu—and instantly began to climb the trunk. It did not spiral its way up the tree, but each one of its hundred and twenty-two ribs kept moving forward like tiny feet over the rough bark, against which the edges of its under scales clung, and seemingly without an effort the snake walked up the tree, almost in a straight line.

Swift and silent as the intruder's motions had been, they had not escaped the watchful eyes of the male owl, roosting in a nearby pitch pine. Just as the pointed head was about to disappear within the hole, there was a flash of wings, and the next instant the snake's brown-and-white body was writhing in the owl's punishing talons. Doubling upon itself, the snake hissed fearsomely—and there is no serpent in America that can hiss louder than the pine snake. Thereafter he rattled in his glottis, with a rapid vibrating noise which exactly imitated the sound of the rattles of a timber rattlesnake. There are few birds or beasts, or humans either, who will interfere with a snake of that size sounding the death-note of the great pit-viper of the Barrens. As a matter of fact, a pine snake has no fangs and is as harmless as the American puff adder, which also frightens away its enemies by pretending to be dangerous. Today, the pine snake's pretense was but a poor protection against the grim bird in whose talons it struggled. In defense of his home the owl would have attacked without hesitation a diamond-back rattler, a hamadryas, or any of the other deadliest serpents on earth, and he made short work indeed of the harmless, bluffing pine snake. By the time the female owl returned, in the cool of the evening, all that was left of the invader were short lengths of neatly dressed, firm white meat.

With never a sound the great owl swooped into her nest. That night, just as the whippoorwill called in the early dark, something, for which she had waited long and eagerly, stirred against her fierce heart. All that night the new life beneath her feathers pulsed and struggled, until as the dawn came into the sky two downy white owlets freed themselves from the imprisoning shells and, panting and quivering, nestled against the soft breast of their grim mother, who gazed down at them adoringly.

WHY VERONICA IS SO NAMED

THE MONKS SAW IN IT THE IMAGE OF CHRIST

BY ALBERT A. HANSEN

As JESUS, heavily laden with the cross, passed along the road to Golgotha, He passed the home of a certain pious maiden of Jerusalem. Her heart filled with compassion at the sight of the sorrowing and agonized face, she ran to the Master and gave Him her kerchief. Jesus wiped His suffering brow and gratefully returned the linen cloth to the maiden.

A miracle had happened!

On the surface of the kerchief an image of His sacred features had been miraculously imprinted!

Ever since, the likeness has been known as *Vera iconica,* that is, the *true image.* The linen cloth was religiously preserved, and tradition tells us that it is the identical kerchief which now rests in St. Peter's at Rome, highly valued as one of the most precious possessions of the Roman Catholic Church.

Desiring to canonize the merciful Jewess, the church named her St. Veronica, a gentle tribute to the *Vera iconica.* A pretty little plant, which grows in abundance in many parts of the world, has an irregular and streaked flower. A fancied resemblance of this flower to the image on the kerchief so inspired the imagination of the ancient monks, that they named the plant after the saint.

And so to this day the modest Veronica adorns our lands to remind us of the beautiful act of mercy of the pitying, pious maiden of Jerusalem.

CHEROKEE PLANT LORE OF THE SMOKIES

BY ROBERT LINDSAY MASON

JAMES E. THOMPSON

WHEN a wilderness wayfarer of the Great Smokies comes upon a Cherokee Indian medicine man and his squaw gathering herbs in the deep slopes of these gigantic mountains he does not thoroughly realize the great preponderance of tradition, prayer formula, and plant myths in back of the acts of the two. A fascinating and charming plant lore is existent here among the intelligent and likable Cherokees and its creation goes back to the beginning of things.

Great story tellers like Old Swimmer (Ayun'ini), John Ax (Itagu'nuhi), Suyeta the Chosen One (a Baptist preacher), Ta'gwadihi' (Old Catawba Killer) of Cheowa, and Wafford, a cultured mixed blood of Georgia, reveal the interesting legends that have grown up around the beautiful plants that adorn the Carolina and Tennessee hills.

According to Old Swimmer —one of my informants among the Cherokees—animals, trees, plants and birds all existed before man and were very powerful. Because of endless persecution by hunters, the animals had grown very antagonistic toward man but plants and trees were very favorable to him and sought to intervene in the age-long enmity, offering to those who were wise enough to "understand their talk", the juice and sap of their leaves and bark to alleviate human suffering. The old-time Smoky Mountain Indian believed that the souls of trees and plants would tell man what was good for his most serious ills if he loved them rightly.

Plants had councils and "townhouses", similar to those of the animals, under Kuwa'hi, or Clingman Dome, the highest peak of the Smokies. They used to mingle with human kind on equal terms and could talk. Each plant had a specific mission to perform. The plants lived in this underworld, which was exactly like ours except that the seasons were the opposite, —for is not spring water warm in winter and cold in summer? Entrance to the abode was gained only through prayer and fasting and by following the proper trails, which were the crystal streams plunging down the rugged moss-covered sides of the Great Smokies. Only the Nunnehi, the spirit people, or other underground folk, could lead man to the Plant World and show him its sights.

© JENNISON

INDIANS HAD A NAME FOR IT

They called this plant, our Viola pedata, "they pull off each other's heads."

© JENNISON

A SHOWY ORCHID OF THE SMOKIES

Orchis spectabilis, a beautiful plant, is one of the many varieties found in the Great Smoky Mountains, and particularly loved by the Cherokees

measures. In their council each Plant, Tree, and Shrub offered to furnish a cure for at least one of the diseases adopted by the Animal Convention and adopted the pledge: "I shall for one appear to help Man when he calls upon us in his need." Thus came about Medicine.

As the luxuriant, flower-filled slopes of the Great Smokies contain several hundred species of trees and lesser plants representing northern as well as southern conditions, the country of the Cherokee has proved to be one vast pharmacy.

The Great Smoky Indian is an exceptionally close observer and many of his plant names are peculiarly apt. Thus the mistletoe, which never grows alone but the roots of which are always fixed in the rough bark of some supporting tree or shrub, is called *uda'li*—"it is married", and the violet is known by the plural name of *dinda'skwate'ski* ("they pull each other's heads off"), revealing that the little Cherokee redskins must have had a game that is familiar to all children.

Rattlesnake master—*Eryngium*—with its long slender leaves like diminutive blades of corn was "green snake" or *salikwa'yi,* and another plant, known as "Job's Tears" on account of its polished, rounded grains, which were used by the little Indian children for necklaces, was *selutsi',* "the mother of the corn." Rudbeckia, our "black-eyed susan", was deer eye (*awi'akta'*) and the beautiful lady's slipper (*Cypripedium*) was poetically named the partridge moccasin! The common may-apple, *Podophyllum,* "wears a hat" (*u'niskwetu'gi*) and the puff-ball fungus (*nakwisi'usdi'*) is "the little star." A common rock lichen bears a musical, if an unpoetic name, in the translation of *utsale'ta,* which means "pot scrapings!"

Other plants whose medicinal value was well

Dine'tlana a'nigwa ("soon after the Creation"), when plants and animals were first made, they were instructed to watch and keep awake for seven nights, just as all devout tribesmen are supposed to do when praying to their medicine. The reward for this vigil was to be a power to make good medicine. If they fell asleep betimes, they were to be punished. Only to the persistent was exceptional ability fully guaranteed.

During this test only the cedar, the pine, spruce, balsam, hemlock, holly, laurel, mistletoe, and the spotted wintergreen stayed awake to the end of the long vigil, so they were permitted the gift of staying green forever and of being the greatest medicine. To the others was decreed the penalty of "losing their hair" every winter. And who has not seen deciduous trees and plants naked and shivering without their clothes in the icy blasts?

At first there were only a brother and sister of each species but later all were allowed to marry and to have children to grow up around them in the forests. This was all "in the long ago."

After enduring a similar ordeal the Animals held an important council at which each member present was given the privilege of naming a disease that could be inflicted upon their common enemy, Man, because of his persecutions. The Bears, Deer, Fishes, and Reptiles, the Birds, the Insects and the smaller animals all had grievances. The Grubworm was selected chief of the council because he was "unega" or "white."

During the august deliberations of the convention the little ground squirrel entered a minority report. He had the temerity to venture a good opinion in behalf of the common enemy. But he was nearly torn to pieces for his trouble by the enraged majority and bears the stripes of his scars to this day! This all happened when "the animals were the same as men."

Gossip travels fast among Nature folk in the Smokies and it was not very long before the Trees and Plants heard of the great evil council. Forthwith they held one of their own and determined to defeat such drastic

© JENNISON

A SOUTHERN MOUNTAIN MAGNOLIA

The six-inch rule at the left indicates the size of the blossom and the leaves

known to the roaming medicine man were Virginia or black snakeroot, *Unaste'tstiyu'* (very small root), for feverish headaches or coughs. Chewed, it was put into tooth cavities to stop aches or was spat upon snake bites to counteract poison. Wild senna, *unegei* ("black"), was effective for poulticing sores, and the graceful vetch or *altsa'sti*—"a wreath for the head"—cured dyspepsia and pains in the back.

The juice of milkweed (*u'ga'atasgi'ski*—or "the pus oozes out") was rubbed on skin eruptions. Skullcap (*gu'nigwali'ski*—"it becomes red when bruised") was a tonic. Crowshin (maiden-hair fern) was fine for chronic catarrh; *Porteranthus trifoliata* is "Indian physic"; *skw'li* (common liverwort), the first thought in coughs; tassel flower (*da'yewu*—"it sews itself up", meaning that the leaves are supposed to grow together again when torn) had virtue as a poultice for bruises. The little fungus *Stypticus panus* with its mucilaginous secretion offered itself for effectually staunching wounds. The dried puff-ball fungus was used as a counter-irritant for pains by placing it upon the skin and lighting it; when it had burned down to the skin the watering blisters were opened, "letting out the pain!"

WELLS

THE BEAUTY OF THE SPRINGTIME

Rhododendron covers the hillsides in the Cherokee country with luscious blooms during March and April. It is one of the "big medicine" family

© JENNISON

TOOTHWORT IN ITS HABITAT

It is a low woodland plant that is fond of rich, damp soil. It was a favorite salad flavoring of the Indians

Solomon's seal—*utistugi'*—was employed as a poultice for carbuncles; *amadita'ti*—"they draw water"—gained a reputation for bladder trouble cures from the sole fact that children used the stems as playthings to suck water through!

Other plants not found in the herb doctor's sack were named because of their supposed conjunction to animal economy. Such are the wild rose, labelled *tsist-uni'gisti*, "the rabbit eats it", meaning the red seed-hips, and the shield fern, *Aspidium*, called *yona-yse'stu* or "the bear lies on it."

The names of still other plants hinge upon ceremonial or domestic uses. Fleabane, *Erigeron canadense*, became *atsil'sunti*, "they make the fire", because its dried stalks lent themselves very readily to primitive methods of kindling a blaze by friction from the bushman's firebow and rod. Bugle weeds, *Lycopus virginicus*, were "talkers" and if chewed, and the lips and tongue were anointed with the juice, the experimenter would be endowed with eloquence. How many of us would like to ship a quantity of this magic weed to Congress or to political candidates talking over the radio!

Medicine men of the Big Smoky tribes used other plants in their sacred prayer formulas. One of the most important was the familiar "seng" or ginseng, *Panax quinquefolium*, sought with so much avidity by all Smoky Mountaineers. To the Cherokee it was *a'tali-guli'*, or "mountain climber", and was addressed most respectfully by their conjurors as *Yunwi Usdi Ada'wahi'yu*—"Oh Most Powerful Magician"— because its odd root resembles the human body. Because this plant is threatened with extinction at a market price of $15.00 a pound for export to China the North Carolina legislature has entirely prohibited its gathering. In collecting it the herb doctor always passed by the first three plants but plucked the fourth and in the root cavity deposited a bead as payment to placate its discouraged spirit.

Two frogs once had a famous duel, using for their lances the stalks of the prosartes, *Disporum lanuginosum*. The apt Cherokee pronounced it *walas-unul'sti*, "the frogs fight with it"! A town in the Smokies was named for this event but the resourceful Anglo-Saxon twisted the name to his own fanciful "Fighting Town". White clover has an Indian name that means "it follows the Unega", or white man. It is indeed found in almost every white man's front yard.

Among the domestic plants, corn or *selu* holds first place because it sustains both man and beast. Such an

MASON

READY FOR THE CORN DANCE

Standing Deer, full-blooded Cherokee, under the tree of Big Medicine

• • •

© JENNISON

A SHY DENIZEN OF THE HILLS

Yellow ladyslipper, which the Cherokees called the "partridge's moccasin"

important item is it in household economy that the Cherokees every year observe a ceremonial called the Green Corn Dance. It is held under the name of *Agawe'la* or "the Old Woman", who was slain by her disobedient sons and whose blood was supposed to have colored the red corn.

This dance, preliminary to eating the first new corn, is one of the most solemn tribal functions observed yearly at the Cherokee Reservation in North Carolina. It is invoked also for the propitiation of sins of the previous year and a prayer for happiness in the ensuing one. Formerly it also provided a general amnesty for criminals. Only those who had fasted, prayed and attended purification ceremonies were eligible to engage in the celebration.

The usual mystic *seven* ears of corn were laid aside when the dance occurred in order to encourage the crop until it was fully ripened. When eating the first ears the participants were not allowed to blow upon them for fear of causing a windstorm to beat down the standing corn in the field! A well-beaten path was also religiously preserved from the field to the house further to encourage the corn to stay at home and not to wander away.

WELLS

TENNESSEE'S STATE FLOWER

The passion flower has played an important rôle in the Cherokee plant lore

The priest of the tribe takes up his abode in the *detsunun'li* or small flat space in the center of the field and chants songs of invocation to the corn spirit for four successive nights; no one is allowed to enter the field for seven nights. At the end of this time a loud rustling is heard—if medicine is good—caused by "the Old Woman" bringing the corn into the field.

Tobacco, which is of American origin, was used only as a sacred incense and guarantee of the observance of a solemn tribal pact. Usually smoked in a pipe it truly became a "pipe of peace" when dealing with the ever encroaching white settler who took vast tracts of land for a mere song. Sometimes tobacco, or *tsalu*—a name now lost to the Cherokee—was gravely sprinkled upon the fire of the townhouse or lodge where the ceremonies occurred. It was never chewed or smoked as a habit of indulgence as initiated by Sir Walter Raleigh. *Tsal-agayun'li* or "old tobacco" was most desired for tribal functions. A famous legend of the Cherokees reveals "How They Brought Back the Tobacco" which was stolen by the *Dagulku* or "The White Fronted Geese." This feat was accomplished by a famous magician who changed himself into a hummingbird.

The poisonous wild cowbane, *Oxypolis rigidior,* bore a doubtful reputation among the Indians. Its odor was vile. Mixed with the food of the victim or used in evil incantations it would destroy his life. Its nauseating smell was a very good protection against snake bite if the spell wielder annointed himself with it. If the snake was angered into fanging the offensive intruder, however, the cure would prove worse than the disease. Poison ivy was also well respected by the Smoky Mountain Indian, who always conciliated it by addressing it as "My friend"—*hi-ginali.* But if, for some mysterious reason,

his friend still persisted in poisoning him he applied the macerated flesh of a crawfish to his hurts and went philosphically about his business.

Smilax briar was *dinu'ski* or "breeder", from the belief that a thorn of it imbedded in the flesh would breed others in a day or two. Devil's shoe string, cat-gut, or goat's rue, *Cracca virginiana,* was *distai'yi* or "tough", and an ointment made of the leaves strengthened the hair of Smoky Mountain squaws, and toughened the sinews of ball players.

Even the humble weeds offered their services in "the long ago" promise to the Plant Council. Important of these are the Jimson weed, the cockle bur, and the Spanish needle, all of which came under the Cherokee generic term of *u'nistilun'isti* or "stickers".

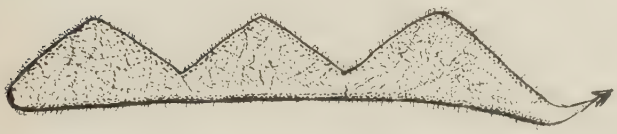
A ceremony appealing in its poetic meaning applies to the Japanese clover. Very soon after a child was born among the old Cherokees this plant was beaten up and put into crystal clear water taken from a cataract where the stream tumbled noisily. It was given to the baby redskin for four consecutive days to make him of retentive memory! The tumult of the cataract was believed to be the stentorian voice of Yunwi Guanhi'ta, or "Long Man", the river god, who taught lessons the child could understand. A similar rite observed for grown-ups was more intricate and the mind must be kept fixed upon the ceremony. If other emotions were allowed to creep in the participator would forever afterward be of such a quarrelsome disposition that no one could live with him.

In the chase, to insure the fatness of the quarry, bruised root of the potato vine, *Aplectrum spicatum,* must be crushed into the wound of a slain deer while the hunter imitates its bleat during the magic process.

Last—but not least—the "rattlesnake's master", *Silene stellata,* was called *ganidawa'ski* because it "disjoints itself". Efficacious in snakebite, a piece of it held in the mouth caused the deadliest serpent to flee in terror. Certain it is that many tales of the mountains have been related of famous battles between the rattler and his inveterate enemies, both the king and the black snake. The two latter, so legend has it, always raced madly to nibble of the precious campion when fanged; then they have returned to fight to the death. When deprived of their life-saver—according to reports—they have ignominiously curled up and died.

Thus have the plants fulfilled the promise they made to aid man so many years ago, in the dim beginnings.

• • •



BURS OF COMMON PLANTS

NO. 4—TICK TREFOIL AND ENCHANTER'S NIGHTSHADE

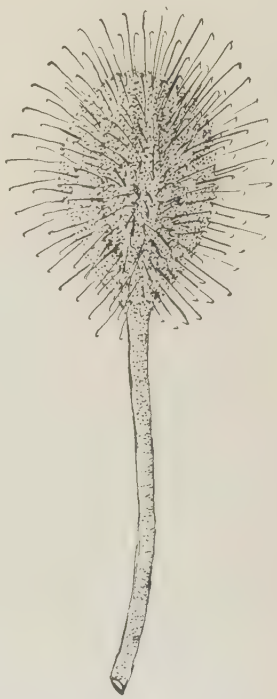
BY SALOME COMSTOCK-MILLER

TICK TREFOIL, the seed-pod of which is a familiar bur, belongs to the pea family. There are many varieties of this species, and all are quite similar. It is recognized by its purple or purplish blossoms, which look like small sweet peas. Its leaf is composed of three leaflets, and its chains of flat, easily detachable pod sections consist of many burs.

In some kinds of tick trefoil the bur, instead of being triangular, as the one here pictured, is almost round. The hooks on the bur, which is about three-eighths inches long, are usually too small to be seen with the naked eye, so that one wonders by what means they cling. They are plainly visible under a magnifying glass, however. They are quite as effective in their powers of adhesion as though they were larger, for their strength lies in numbers rather than in size. This plant is commonly found in meadows and open woods, and along roadsides.

CLINGERS BOTH

The saw-edged tick trefoil and the many-hooked enchanter's nightshade are each stickers



Enchanter's nightshade grows usually in the woods. Each of its numerous one- or two-seeded burs is provided with a rather long individual stem, and these in turn are distributed along a main stalk. The bur, which is about a quarter of an inch long, nearly always carries its stem with it when detached from the stalk. The plant is rather small and frail; its leaves are undivided and in pairs. The common species usually grows about a foot or more in height. Another species, called smaller enchanter's nightshade, grows less than twelve inches high. Enchanter's nightshade is found in many parts of the world, although not in very great abundance.

SIXTEEN MILLION WASHINGTON TREES

BY CHARLES LATHROP PACK

PRESIDENT OF THE AMERICAN TREE ASSOCIATION

With the flashing of thousands of spades the Tree Planting Army has been on the march during the spring tree planting season of the George Washington Bicentennial Year. Directing the attention of the American people to the importance of forest protection and reforestation, the planting of living trees as memorials to the Father of His Country has reached and far surpassed the goal of ten million trees that was set.

When the idea was first suggested by the American Tree Association, more than one year and one half ago, the response was immediate. The thought of creating a living memorial that would continue to carry its messages after the din of parades and the echoes of speeches had died away appealed to individuals and groups alike. It offered opportunity for community effort; for roadside improvement; for beautification; for the creation of school, farm and civic forests—all dedicated to Washington.

Recognizing the importance of this undertaking, the George Washington Bicentennial Commission asked the American Tree Association to carry on the work. When the goal of ten million trees was set, however, even lovers of trees felt that it would be impossible to reach that mark during 1931 and 1932. They had not reckoned with the enthusiasm of the American people. They had not envisioned the way in which the idea would be caught up and handed on. They could not realize that by late April there would be registered upon the National Honor Roll of the American Tree Association a total of 16,284,761 trees planted in memory of Washington.

Still the planting goes on. Registrations will be added to this number all during the 1932 bicentennial year, and certificates will be issued to tree planters who plant and dedicate memorials during any month of this year. Final tabulation of the grand total of plantings will not be completed until the year 1932 has passed into history. The National Honor Roll is still open for the inscribing of additional names.

One of the outstanding features of the bicentennial tree planting has been the response from schools. Thousands of school grounds have been beautified and thousands more school children have had the opportunity to realize the need and value of planting trees.

A study of the registrations is fascinating. From plantings of individual trees, programs range upward to the planting of 640 acres as a memorial forest by the Wisconsin Federation of Women's Clubs. The program has, indeed, contributed greatly to making both the present and coming generations forestry-minded.

Awake to the significance of the plan, Governors of several states have issued Arbor Day proclamations specially calling attention to the bicentennial tree planting campaign and its educational value. From the offices of the American Tree Association have gone forth millions of pieces of printed matter carrying suggestion and inspiration to women's clubs, schools, civic organizations, parent-teacher groups, Rotary and Kiwanis Clubs, Masonic organizations and many others. The message has been carried throughout the far flung national organizations of both the General Federation of Women's Clubs and the Daughters of the American Revolution.

Quick to see the value of the plan, the editors of the country have supported it generously in news and editorial columns. Knowing that the American Tree Association is dedicated to constructive education only, and that membership is free to any one who plants a tree, the endorsement of the editors of the country has been unstinted.

It would require a large volume to list those on the National Honor Roll, but the records reveal many interesting and significant tree plantings. There are the registrations from the pupils of several Indian schools; from a school for the blind in Indianapolis. There is the name of the boy who was lifted from the wheel chair to which he was confined that he might throw a spadeful of earth upon the roots of his George Washington tree. There is the tree planting in Washington, D. C., on April 12 for a baby born Feb. 22, 1932, with the baby present at the planting. There is the tremendous community effort of Berks County, Pennsylvania, where nearly two million trees were planted, and the program in the Dayton, Ohio, schools where 53,000 planters were registered. Behind all these there is a spirit and a vision. It is the same inspiration that made the forest ranger in the Philippines bring a little tree down from a mountain top and plant it at his ranger station, as a memorial to Washington.

An avenue of bicentennial trees leads to the Akron, Ohio, airport. Thousands, in coming years, will see the fine grove of trees planted by the District of Columbia D. A. R. on Hains Point. More thousands will see the memorial beech planted at the approach to the Arlington Memorial Bridge by the National Society Daughters of Founders and Patriots of America. Also in the National Capital will stand the American Elm planted on the campus of American University by the National Society of New England Women.

In years to come trees planted in memory of George Washington will be found the length and breadth of our country. Appropriate markers are being placed in many cases. So, when the last tree is planted, the Tree Planting Army will have erected a memorial that is, it seems to me, one of the greatest that the world has ever known. And they have dedicated it to a man who both loved and appreciated trees and have given this memorial to a nation that must have concern for its trees and its forests today and for many tomorrows.

ABOUT A WHITE PELICAN

BY MARJORIE SHANAFELT

DECORATIONS BY JEX

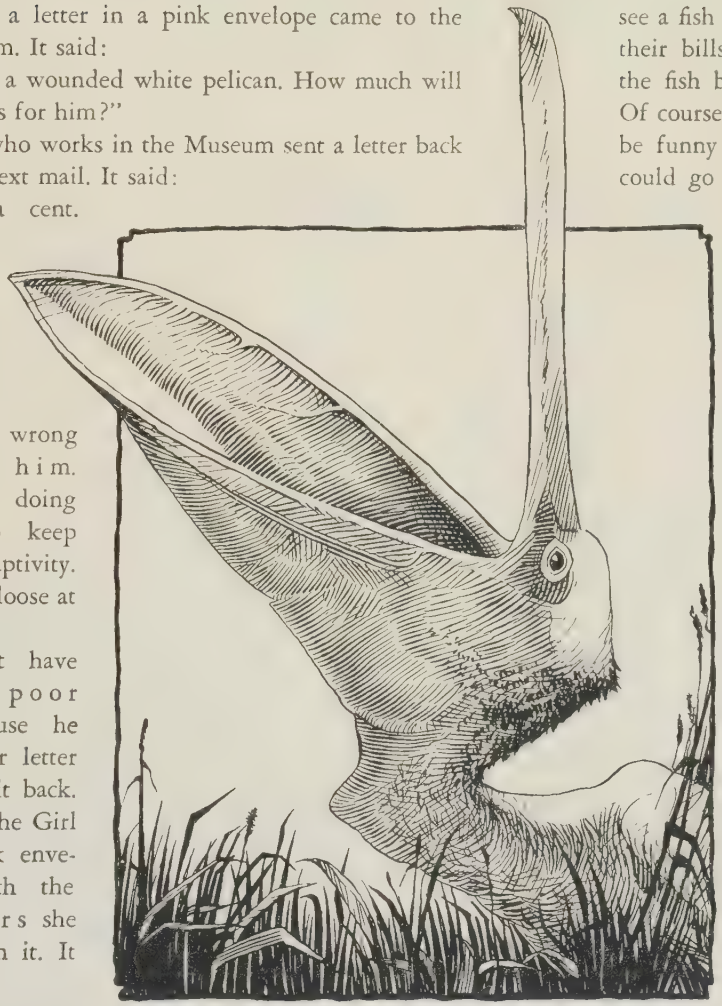
• • •

ONE day a letter in a pink envelope came to the Museum. It said:

"We have a wounded white pelican. How much will you give us for him?"

The Girl who works in the Museum sent a letter back by the very next mail. It said:

"Not a cent. Pelicans are protected by the Government. You've done great wrong to injure him. You are doing wrong to keep him in captivity. Turn him loose at once."



That must have scared the poor farmer because he wrote another letter and hurried it back. The minute the Girl saw the pink envelope in with the other letters she pounced upon it. It said:

"We didn't hurt the pelican and we didn't catch him. We found him in our wheatfield after a bad storm. He has a big cut on his breast and can't fly. We don't know what to do with him. He won't eat."

That made the Girl feel better. She wrote another letter and it wasn't a bit cross. It said:

"That is too bad. You had better keep the pelican awhile and if there is any trouble over your having him, we will explain the matter to the authorities. Pelicans eat fish. They fly over ponds and when they see a fish they dive down and scoop it up in their bills. The water runs out and leaves the fish behind for the pelican's breakfast. Of course, you haven't any fish and it would be funny for a farmer to stop work so he could go fishing for fish to feed a pelican. Even though you might like to have a good excuse, the corn and wheat and potatoes would suffer. The best thing you can do is to feed him raw liver. He will like that, but you will have to put it in the bottom of a tub of water so he will think it is in a creek. Then, in a couple of weeks, when his breast is healed, he will fly away to join his mates."

The Girl didn't get another pink letter for ever so long. Then one day she saw one. She grabbed it at once. It said:

"The pelican is so friendly that he follows us all around the yard. His breast is healed but he won't fly away. He eats so much liver we don't know what to do. We live so far from town that we have to buy a lot of liver at a time and then it spoils. He is a very expensive boarder. Can't you find a home for him?"

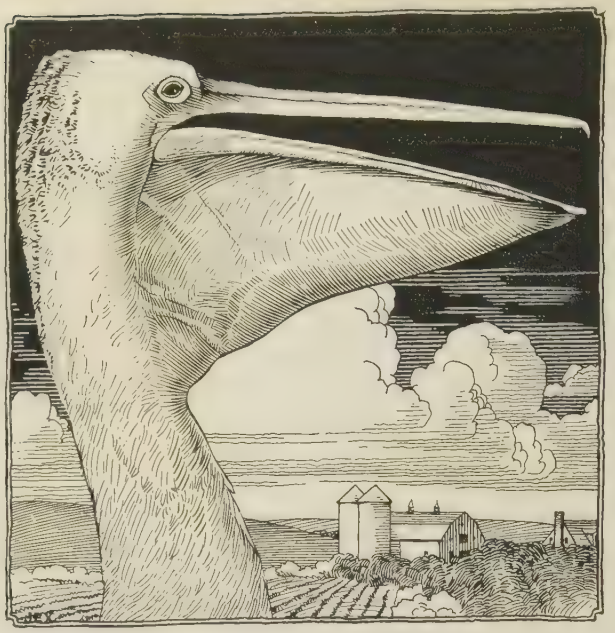
The Girl had a deep thought wrinkle on her forehead by that time. She called up the city parks but they didn't want a pelican. She called up a pleasure resort but they didn't want one. She called up the cemetery but they had too many swans. Then while she was trying to think of other places the Girl wrote the farmer another letter. It said:

"I am trying to find a home for the pelican. If you can hold out two weeks longer, I think we shall be

able to find one."

That very afternoon the Girl found a pink envelope in the mail. It said:

"A neighbor of ours took the pelican and is feeding him. They like him very much."



The Girl thought that the neighbor would probably get tired of him too, so she went right on trying to find a home for the pelican. She asked people who had large country places but none of them wanted a pelican. Then she remembered that in Chicago, in the Lincoln Park Aviary, there were a lot of contented pelicans. They had a long oval pond stocked with fish and there were great scraggly trees growing on a little island in the center of the pool. The sun shone down all day long through a great glass roof, and there were all sorts of other birds for company. So the Girl wrote a letter to the Superintendent of the Aviary. In only three days she had an answer. It said:

"We shall be delighted to get the pelican. Just put him in a crate and express him through."

"Hurrah," cried the Girl and once more wrote the farmer a letter. It said:

"Tell your neighbor we have a home for the pelican. Put him in a crate that won't let his toes stick out. Put in some water and express him right through to the Lincoln Park Aviary, Chicago, Illinois."

Two days later the Girl got her last pink letter. It said:

"We did. He is gone."

In a few days the Girl received a letter from the Superintendent of the Aviary. It said:

"The pelican is here, eating fish out of the pond. He is a fine bird and we are very glad to have him. Thank you."

And that is the end of the story about a white pelican, the pink letters and the farmer who wrote them.

• • •

ON WESTERN TRAILS

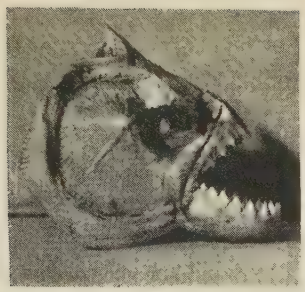
There will be no western trail trips conducted this year under the immediate auspices of the Department of Field Trips of the American Nature Association. This does not mean that the popular Field Trip activity is permanently abandoned but that, owing to certain circumstances, it has been temporarily laid aside.

Many of our members, however, have been writing us during the past three or four months to find out what plans we were making. So active has been this interest that we have felt that we must at least help these members with their travel plans. Consequently we have conferred with officials of the Union Pacific and Southern Pacific Railroads on the matter of itineraries and the handling of groups particularly interested in the type of trip that we have conducted to western wonderlands.

As a result parties will leave Chicago over the Union Pacific System on July 17, July 31 and August 14 with a special leader to visit the glorious region of Zion, Bryce Canyon and the Grand Canyon. Also as a result of our conference with the officials of this railroad we are able to endorse these trips and to assure our readers and members that they will find these trips ably conducted, congenial in membership and most remarkably reasonable in price. We trust that many will be able to take advantage of this opportunity to travel with these endorsed groups.

In cooperation with the Yosemite Park and Curry Company, the Southern Pacific Railroad has worked out some remarkable trips in the high Sierra—trips that appeal specially to those who have travelled with the Nature Magazine parties and those who wish to do so. Pack trips, saddle trips and walking tours, with overnight stays at these camps high in the California mountains, have an appeal all their own. The Department of Field Trips of Nature Magazine urges its friends not to overlook the unique vacation opportunities that they afford.

On Page 335 of this issue of Nature Magazine will be found further announcement relative to California trips and the Yosemite. On Page 333 will be found information relative to the wonderful attractions of Bryce, Zion and the Grand Canyon. Also the Director of Field Trips of Nature Magazine will be glad further to advise readers relative to these trips or to aid individuals and groups in planning itineraries to any western points, drawing upon our own experience in so doing. This year offers excellent trips at low costs.



THE SKULL OF PERAI
His jaw is strong enough to cut wire and kill trespassers on his domain

• • •

A NEST-BUILDER
The stickleback creates a home as does a bird

WHY THEY SURVIVE

QUEER DEVICES HELP ANIMALS TO LIVE

BY PAUL GRISWOLD HOWES

NATURE endows her creatures with many wonderful devices that aid them in their difficult lives. She equips them with protective and aggressive apparatus and with super-sensitive organs of marvelous construction. But for these, their lives would have short durance, for the enemies are legion. Yet the life-saving implements are strange and ingenious—Nature has not always cared about short cuts.

Consider the plumes of one of the South American butterfly families. The Imperial Guard in all its glory was not arrayed like one of these. These feathery air-dusters are really scent plumes, erected out of a slot in the hind wings of the male, and, as noses, are so delicate that the creatures can scent other members of the family at great distances. The hairs are equipped with tiny pores and nerves, by means of which males locate their mates.

The perai, or cannibal fish, of tropical American rivers are not large. Yet they have been found with birds in their stomachs, and they will snap a wire leader in two with the sharpness of pliers. It is their powerful skull that gives them such abilities—it enables them to attack trespassers on their domain with fatal results.

No one would pay much attention to the stickleback, a common little American fish, if he did not build a nest just as a bird does. The creature uses bits of grass and water weeds, and fastens the whole together with mucous threads. When he has finished his architectural labors, the female deposits her eggs, after which the male turns soldier, and guards the home he has constructed.

And there is a bug, a Renoid, that is not a wasp, although it seems almost identical in every respect. It is just a bug, who, like a camp-follower, masquerades for what he is not, so that his enemies will fear him as they fear the lance of his unknowing protector. A great many mimics like this faker exist in the world of Nature.

THE MIMIC OF A WASP LIVES BY HIS TRICK
Enemies that would like to feast on him are driven away by his close resemblance to the hot-tailed insect he resembles

"HUNG OUT THERE ON THE LIMB TIP THIS NEST DEFIES ANY CREATURE WITHOUT WINGS"

• • •

LORE OF THE ORIOLE

BY WILLIAM ATHERTON DU PUY

ILLUSTRATED BY R. BRUCE HORSFALL

• • •

Now comes the oriole, perfect member of the feathered world, whose very name is from a word that sets it down as the bird of gold. It swings its marvelous basket in one's front yard, and we accept it at its face value. Few of us know, however, that the Baltimore oriole is not an oriole at all. Europe had a bird that it called "oriole" before America was discovered. So when the colonists came to America they found, flitting among its trees, a bird brilliant in orange and black that looked not unlike the golden oriole they had known at home. Empire builders, not ornithologists, they called this bird after its European prototype.

Particularly abundant is this American oriole in middle latitudes—in New York, New Jersey and Maryland. It was in this latter state that Lord Baltimore planted his colony, and, since the livery of his lordship was black and orange, this denizen of the woods, similarly arrayed, was called the Baltimore oriole.

As knowledge of the new continent was increased, it was found that the radiant Baltimore oriole spread from the Atlantic to the Great Plains, and from southern Canada to the Gulf. These birds would deserve sufficient fame if they rested their claims alone upon the principle that a thing of beauty is a joy forever. There are few handsomer, more brilliantly colored birds. Black-crested, orange-bodied, black and white tipped, trim in form, sprightly and graceful, they brighten any picture in which they appear and well deserve their other names of fire-bird and golden robin.

Then to beauty they add usefulness. They work all the time at the business of destroying injurious insects. They like nothing better than to pick foliage-eating beetles and caterpillars. There are certain fuzzy and hairy caterpillars that most birds shun. These caterpillars have developed a body-covering for the very purpose of making themselves unpopular with the birds. The orioles, like their fellows, will not swallow these creatures, but they have a way of their own of ripping them open and

"THE MOMENT HE ARRIVES IN SPRING HE BEGINS TO CALL "SEE ME, SEE ME"

• • •

getting one choice bit out of their vitals. Thus it takes many caterpillars to satisfy an oriole.

The oriole catches only insects that are clinging to the branches of trees. It does not swoop about as do the swallows and catch insects on the wing. It does not gobble them on the ground as do the crows. It does not intrude into the woodpecker's sphere, which is along the trunk.

But in addition to being beautiful and useful the oriole is, at the same time, a most cheery musician. The moment he arrives in the spring, choosing the background of a cherry tree in full bloom to set off his colors, he begins to call "See me! See me!" Then as he goes about his hunting among the branches he chirps spiritedly if irregularly, sandwiching in his song between caterpillars. Later, of a forenoon while his mate is hatching the eggs, he gives a music recital every day in a nearby tree-top, following a martial strain with a flute-like mellow voice, somewhat given to an irregular arrangement and a shifting of the accent to the wrong beat. It is altogether a lively, active, stirring strain, tending somewhat to ragtime.

Yet even these are but the lesser virtues of the oriole. Another is the wisdom the female uses when she builds the nest. The oriole selects an overhanging branch of some great tree, goes away out near the end of it, finds a place where three or four twigs are hanging down close together. Upon them she builds. She constructs a hanging home. Whatever wingless enemy would reach this nest must climb this great tree, must creep out along its big limbs, must follow down these smaller hanging branches, all of which is no mean feat. Hung out there on the limb tip this nest defies any creature without wings—with the possible exception of the nimble red squirrel—to get to it. In her workmanship, in her skill as a weaver, the oriole is a master. She weaves a nest that is as clever a piece of construction as any needlewoman ever knitted with all her ten fingers and rods of steel or bone. Yet nothing would suit her better than the yarn that the housewife crochets, but which she may not go to the store to buy. She must forage for its materials and she has come to depend largely upon man for the nest building materials. The twine that wraps his bundles, the ravelings from his carpet, the cloth string with which he ties up the plants in his garden, are favorite materials for the making of oriole's nests.

You may have white yarn available. Cut it up in pieces two or three feet long, lay them beside the path in your yard. Doubtless they will be seized upon by the birds.

Replace the bits that disappear. Keep the supply abundant for a week. In the end you will find that the orioles have swung a white nest at the top of the elm tree limb.

Given string the oriole will suspend a number of loops. When they are placed the birds begin weaving in the strands. In and out, diagonal, crosswise, go these threads. They are woven together into a wall that is smooth, strong, pliable and anchored sturdily to its twig joists. The nest is a deep, narrow bag, quite safe to hold the precious eggs and young regardless of the swinging that tempestuous winds may give it.

There is a basic marvel back of the ability of birds to perform tasks such as that of the oriole in making its nest. The bird, it must be remembered, has no hands. Insects have their pinchers, their fore feet, that are strangely developed to perform their special tasks. Mammals mostly use their fore feet as hands, feed themselves with them as does the squirrel, dig themselves a home in the ground as does the groundhog. But the bird has given up its hands for all such uses that it might devote them to the difficult specialty of flying. When this happened the bird seemed to agree that its hands should be tied forever and that it would try to develop some other means for doing their work. It developed its beak or bill to do the work of hands.

Yet this beak is but an instrument like a pair of pliers made of two stiff pieces of horn. It is remarkable that a bird so equipped should be able to perform so effective a feat of weaving as it does in fabricating this hanging home. Almost every bird has peculiar tasks which it performs but the oriole is the master weaver.

• • •

TEASEL AS A DECORATION

BY ANNE BELLE LOKEN

ONE WOULD scarcely have imagined two decades ago that the gaunt, stiff teasel or fuller's thistle that grows by the roadside would in time be accepted to grace a home for artistic purposes. But some clever person had the inspiration to gild it and place it in an attractive jar in the corner of a room and lo, its popularity began! It possesses a weird, angular beauty which makes an unquestionable appeal. The stalks are left to dry before cutting, then painted with gold, silver or iridescent colors, depending upon the tone needed to harmonize with your other decorations. Picked in the green state while flowering it is extremely charming as a vase decoration.

TEASEL BURS ON THEIR STALKS
The woolen industry finds them essential, and uses them to raise the nap on cloth

Teasel has been and is still of real practical benefit to mankind. The flower heads when dry seem to be just prickly enough and strong enough to function perfectly as cards to raise the nap on woolen goods when manufactured. It is cultivated extensively in England and sent to the woolen manufacturing towns for this purpose. Teasel was introduced into this country from England many years ago. After it has withered, the plant is cut off about eight inches below the head. The stem, freed from its many prickles, makes a strong handle for the card. But if the work is accomplished by machinery the flower heads are halved or quartered and glued to the periphery of a wheel, which is caused to revolve in contact with the surface of the cloth. The name teasel is said to have come from the function of "teasing" the nap up on materials.

This plant in its flowering stage has very small orchid or lavender flowers that nestle in among the bristles of the heads. These heads are three or four inches long and are surrounded by pointed, erect bracts. It grows in waste places and along roadsides, and in autumn its shaggy, thistle-like flower heads may be seen almost anywhere. These dry, cone-like burs persist until spring, standing erect and stiff upon their stalks.

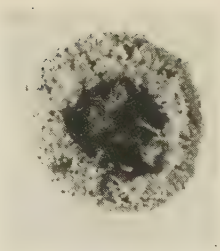
ANT-LIONS AND PIT-FALLS

OR "BEAUTY AND THE BEAST"

BY A. B. CHAMPLAIN

PHOTOGRAPHS BY THE AUTHOR

A GRACEFUL BEAUTY WITH MOTTLED WINGS
It produces children of grotesque ugliness which later become like itself



THE COCOON
The opening is made to permit emergence

AMONG the interesting six-legged children of life, the ant-lions should have some publicity. Not on account of any economic importance, but because of individual peculiarities and remarkable habits, not the least of which is the difference between the adults and the larvae.

One looking at the short, squat, grayish infants with the wicked-looking, sickle-shaped jaws would never suspect that they were offspring of slender, graceful parents with the four delicate, transparent wings.

Ant-lions hatch from eggs laid in the sand by the winged adults. In this environment they spend their youthful lives. They have six legs but these appendages are so poorly developed as to be of very little use to the owners. In fact, the hind legs alone are employed for locomotion and this pair can only drag them slowly backward. Yet ant-lions feed only on the most active insects!

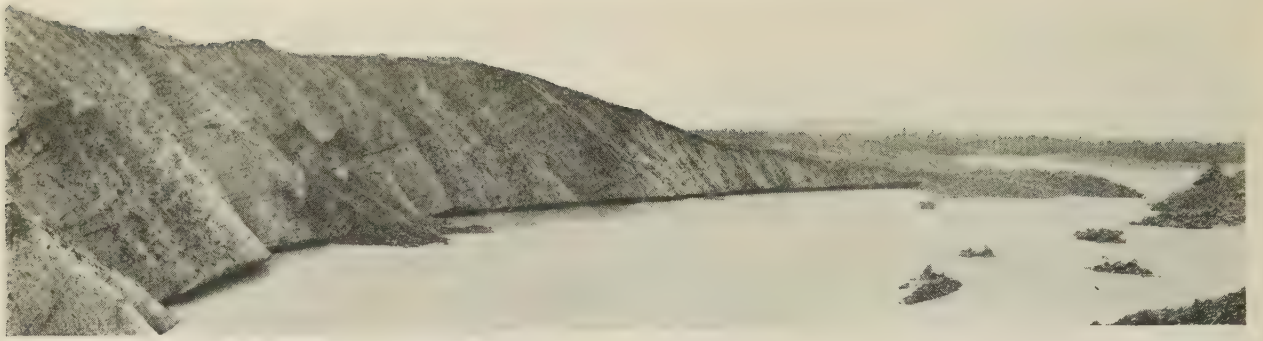
First these larvae, the ant-lions, dig little pits. They usually select a site in the vicinity of ant colonies, where the sun shines and where the earth is more or less free from stones and debris. Here they burrow into the earth or sand and construct their celebrated pit-falls, used to entrap ants and other desirable insects.

THE ANT-LION IN PERSON
With those gaping jaws it seizes upon and sucks the juices from the insects that fall into its trap

An ant-lion makes its pit by turning round and round and working backward. During this process it scoops up the loose sand with its large flat head, using it as a shovel, and throws the particles out from the funnel-shaped hole. After completing the cavity, made by its twistings, the larva or ant-lion buries itself in the sand at the bottom, with only part of its head and the widely extended jaws visible. Now it is ready for business.

Ninety-nine times out of a hundred the inquisitive ant strolling that way will be sure to take a look into the cavity. It feels itself slipping and starts some sand rolling. As it struggles to regain its footing it starts a landslide. This is a signal for the waiting ant-lion. To facilitate matters and to keep the pit from becoming filled it starts throwing up sand from the bottom with its head in quick, jerky showers. Then the victim comes tumbling down toward the bottom, into the extended jaws of the "lion" of the pit. These jaws, curved and slender, are grooved for sucking the juices of prey and are the formidable part of the insect. The ant is immediately seized between these tubular mandibles and sucked dry, after which the dead and withered carcass is tossed out of the pit.

By and by the burrowing life of the ant-lion comes to an end. It has eaten enough to carry it through its next period to adult estate. So it spins a silken cocoon in which to take a rest. As there is not much silk to spare a quantity of sand is glued together with the silk, forming a curious hollow ball. It is lined with silk on the inside, making a cosy little bed in which our ant-lion continues its metamorphosis. Inside this globular cocoon it may pass the winter months, or remain until (Continued on page 376)



WHERE LAKES ARE BORN FROM THE ICE-FIELDS

An ice-cliff along the front of the Sheridan Glacier in Alaska. The bodies of water are only a few years old. Note the glacial debris that covers the clear ice

TOPOGRAPHY IN THE MAKING

BY H. J. LUTZ

THE great eroding power of rivers and other streams is recognized by all since we have so many examples of their work before our eyes every day. The infinitely greater power of water in the solid form as an eroding and sculpturing agent is not, however, quite so apparent since its present activity is more or less confined to high altitudes in the mountains and to the northern latitudes. It is fortunate that the same great dynamic forces of Nature which shaped the glaciated region of the northern United States may still be seen at work in many parts of Alaska. Through study of these glaciers we are better able to visualize the conditions which existed at the close of the great Ice Age a few thousand years ago.

In order better to understand glaciers and their work let us first see how they come into being. As the snows of countless winters accumulate in the high mountain valleys and amphitheaters the lower layers become compacted and changed in character by the great and ever increasing weight of the layers above. First they become porous ice, then finally crystalline ice, under the tremendous pressure. In time these great ice masses begin to move—very slowly of course—and majestically descend to the lower slopes. Ofttimes, if they were formed near the coast, they reach the sea.

As these mighty masses of ice creep powerfully down they resemble a river in many ways. Their movement is actually one of flowage, due to their own tremendous weight and the force behind them, and, as in a river, the movement is more rapid in the center than along the sides. A river erodes, transports and deposits material along its course. So does a glacier. The main difference in the action of the two agencies is that the glacier acts more slowly, more powerfully and more effectively.

An ice-sheet carries down a tremendous burden of rock and other debris within and under itself. Most apparent, probably, is the material which it carries on top but actually this is but a small portion of the total load.

WHERE ONCE LIVED A MIGHTY FOREST

The stumps of trees mark the verdure which the ice buried and later released. The forest sprang up during an interglacial period of relative warmth

Of course the more rock a glacier has embedded in itself the more deadly is its erosive power. The bottom may well be likened to a giant rasp studded with rock fragments for cutting. It is difficult for one to conceive of the millions of tons of rock which these slow-moving monsters carry until they are seen in action.

In many parts of Alaska the familiar handwriting of the ice is everywhere. Along the coast especially the country abounds with the U-shaped valleys, gorges, and canyons distinctive of glaciated country. Everywhere there is manifest the great sculpturing power of ice. Some of these immense hollows are partly filled by the ocean and in this condition are called, variously, fiords, canals, straits, or passages. Many of the deep, steep-shored bays are nothing more or less than glacial gorges, branches of a once far more extensive system that stretched inland.

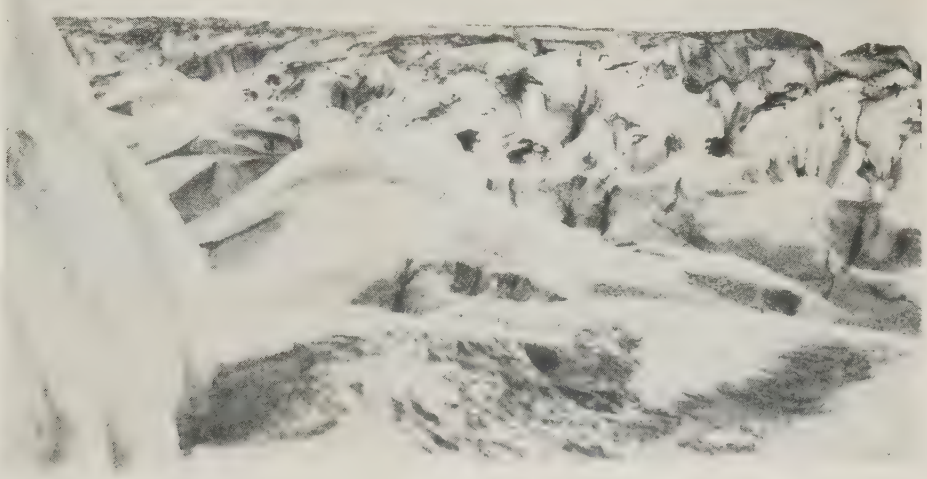
A HUNDRED FOOT "CHIMNEY"

Formed by surface streams, and beautiful with its azure sides and frost crystals, it indicates the greatness of glaciers

The colossal carving power of these rivers of ice is shown in countless places. From Lynn Canal, a fiord about ninety miles long, it is estimated that more than two hundred cubic miles of rock have been gouged out and dumped into the Pacific Ocean. While in most places the ice has retreated well up to the heads of the gorges, there are still places where extensive sheets are found and where the glaciers reach the sea and there discharge their burdens of ground-up mountains. The Malaspina Glacier alone covers about one thousand five hundred square miles and is estimated to be from one thousand to one thousand five hundred feet thick.

While it is interesting to see the effects of glaciation in a general way and to view their general effect it is much more instructive to see particular ones, and by forming intimate acquaintance with them, learn more of their ways.

Several opportunities were afforded the writer to glimpse the work-shop of Nature and see her at work moulding new land features and reshaping old ones. To observe one of these living rivers of ice is like visiting the studio of a master sculptor. There one may see lakes, streams, ridges, and hills being shaped into what will be the topography of tomorrow. Millions of tons of rock and gravel are scooped out in one place to form a lake and piled up at some distance to form a low, round-topped hill. One cannot but feel a



ON THE BACK OF A GREAT GLACIER

The surface is often broken into a labyrinth of yawning crevasses, making travel both dangerous and difficult. Studying ice sheets is not play

GREAT CAVES ARE FORMED BY THE STREAMS

Vaulted ceilings 70 feet high, made of ice as blue as the skies, create veritable fairylands beneath the glaciers

certain awe in the presence of such manifestations of limitless power. Not only the vastness of the enterprise and the tremendous forces at work but the freshness and newness of it all impress.

Close by the glacier one may see a new-born lake, gently lapping its rocky, ice bound shores, without any evidence of life. Only a few years ago this spot was covered with a blanket of deep blue ice, and as yet Nature has not had time even to clothe the naked, boulder-strewn slopes. As time goes on, however, and the hillsides become more stable, a few plant pioneers will creep up, closely followed by willows, alders, and spruce. Another lake sculptured out a few years ago by the same glacier has two small islands in it which look like miniature flower gardens with their pink fireweed.

The glacier itself is cut up into a labyrinth of rock-strewn crevasses and ridges, with occasional azure valleys. One crosses innumerable little streams on the ice, some of which slip noiselessly along their smooth blue channels while others gurgle gleefully as they speed on their tortuous way deep down below. Hearing a musical tinkling and looking about one may see a shaft which seems to pierce to the very heart of the glacier. A glorious sight greets the eyes of him who has the temerity to creep to the edge and look down—the deep azure blue seems fairly to glow from the walls, which are covered with crystals of frost that scintillate like millions of diamonds. Far below in the chill darkness is the little stream laughing along its serpentine channel.

CHENEGA GLACIER AND NASSAU FJORD

Large bergs continually break off such ice fields during summer months and thunder into the icy waters below

The deep crevasses and the often partly concealed ice bridges make travel over the glacier slow and sometimes treacherous. Following along its flank one is astonished at the rocks which have been torn from the mountain against which the ice is nestled. Great blocks, as large as houses, are plucked out of its side as if they were pebbles.

The streams coming

from under a glacier are all agents of great erosive power and one can hear the rocks and boulders rumbling along the beds of the larger ones. These objects cannot be seen because of the murkiness of the silt-laden water.

Not only do the glacier waters roll large rocks along but they also carry tons and tons of rock-flour in suspension. In places "pot-holes" are developed where the pent-up waters are thrown several feet into the air as they emerge from under the confining ice mass. Often the water is lashed to foam by the tremendous pressure behind it.

Sometimes great difficulty is experienced in crossing such streams. One cannot see the bottom because of the milky silt-laden water so it is all too easy to step into large holes or pockets of quick-sand. On several occasions I encountered streams so swift that I was unable to traverse them at first attempt for fear of being swept off my feet. In such cases I sometimes found a heavy log and carried it across on my shoulder as added ballast so I could keep my feet.

The work of the glaciers cannot always be considered constructive, for their streams often do great damage to property. Warm rains and warm weather invariably cause the waters to rise rapidly and ofttimes they sweep out of their old beds. When such events occur large areas of timber may be killed by flooding and smaller areas may be swept away entirely. In past times some of these great ice sheets have crept down and covered up mature forests. Gravel and other outwash debris was first filled in around the standing trees by the rising glacial torrents; then the ice followed and completely over-rode the deposit. For countless years it held these forest remains locked beneath it, then, as the ice melted, gave them up.

To see these great dynamic forces vying with each other in shaping newborn valleys, rivers and lakes, is to gain a keener insight into the slow but sure ways of Nature.

PLUCKED FROM THE MOUNTAIN-SIDE

A block of rock as large as a house, which a glacier picked up, carried for miles, and is now setting down

A U-SHAPED GLACIATED VALLEY

As the glacier, which once occupied this valley, receded, it left rounded slopes instead of a V-shaped gorge

A GLACIAL STREAM IS TORRENTIAL

Turbid with rock-flour, swift and wrathful, it sweeps down as an icy flood capable of tremendous damage. Such waters often leave their courses and cut through new country

GOLFERS RAISE OWN "BIRDIES"

SCARSDALE GOLF CLUB FOSTERS WILD DUCKS

BY RICHARD W. WESTWOOD

ONE OF the few golf courses in the world on which a player may make a "birdie" by failing to drive a water hole is located in Scarsdale, New York.

It is the Scarsdale Golf Club course, where, during the past few years, from fifty to two hundred wild ducks have been raised annually on a little lake over which the members play twice during a round of 18 holes. Although their wings are not clipped, and they are free to fly at will, many of the ducks stay within the portion of the lake that has been fenced for them the year round, while larger numbers fly back and forth between the Hudson River or Long Island Sound and the golf course, arriving at the lake in time to share the food that is put out for them twice a day.

GOLFERS' PETS
Part of the flock of the Scarsdale Golf Club. The course is in the background. Below are two mallards on adjoining nests

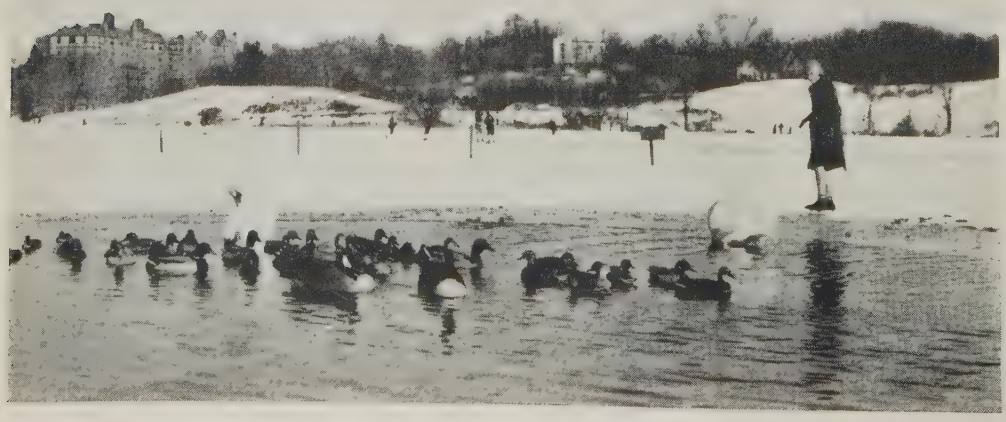
Many of the birds breed and raise their young close to the fairways and tees without seeming to be bothered by the golfers, then take their broods to the lake, where they stay until full grown. On two occasions last year wood ducks, which had nested within half or three quarters of a mile of the lake, were seen leading their young across the fairways toward the water. Black ducks are numerous at meal time, but it was not until recently that young were seen. A brood of eleven put in their appearance last summer, however, and are still paddling around the little body of water with the main group.

The ducks keep their enclosure open during the winter, and few, if any, are lost from the cold. They apparently do not mind the skaters and hockey players that crowd the ice of the lake every day.

About one hundred ducks were raised last year, and only half of them flew away when full grown. It is believed that some of these nested in the islands in the Bronx River.

On the lake at present are mallards and black ducks, teal, canvasbacks, red heads, wood ducks, pintails and baldpates, and a pair each of scaups, gadwalls, shovelers, and brant. The Club at one time boasted of possessing Canada geese, but they fought with the swans and had to be given away.

The National Association of Audubon Societies is at present engaged in urging golf clubs to foster bird life, and the action of the Scarsdale Club furnishes an excellent example of the results which may be obtained. Most of the members of the Club have a much greater interest in "birdies" than ever before, while the birds appear to have no fear of being struck by whistling slices or hooks. The Club has put out about 100 nests for song birds during



IN WINTER QUARTERS
Skaters do not seem to disturb the ducks. They keep the water open all winter, and none of them freeze

the past two years, and is certain that they are of inestimable value to the Club as insect and worm destroyers.

The time may come when the Scarsdale Club members will find their adopted feathered friends so interesting that they will sell their clubs and buy binoculars and bird books. Even at the present time, many a match is held up while some of them go investigating a mallard's nest or stop to watch a black duck give feeding lessons.

• • •

THE WESTERN COTTONWOOD

BY MARY E. TOWNE

No tree, perhaps, has meant so much to the early settlers of the great western plains as the western cottonwood, one of the largest of the group. As the pioneers were traveling in ox-cart and prairie schooner out from the East, they camped under these monarchs, and used their fuel and the water of the little brooks along which they grew. Their great trunks were used by whole communities to build stockades against the Indians.

The first towns set out rows of them along their main streets, hauling water in barrels from rivers to irrigate them. As little houses sprang up on the treeless plains, the ranchers brought them from great distances, to create groves for shelter against the storms. These trees are now majestic in their size and beauty, and stand sixty to seventy feet in height, with trunks three or four feet in diameter.

Although the wood of the cottonwood is too light for building purposes, the tree grows so rapidly and so well withstands the hot, drying winds and dry soil of the plains, and is so handsome at all seasons of the year, that its popularity has never waned, although there has been considerable hue and cry in cities because of the "cotton" that flies from it when it is spreading its seeds.

It is among the first of the trees to leaf out, and the young leaves have a tender shining green of surpassing loveliness. In the fall the tree is a great mound of clear, shining yellow that glows like molten gold against the blue of October skies.

The blooms—the staminate flowers with their rich red catkins, and, later, the pistillate ones with their delicate green ones—appear in March and April. Soon the shining heart-shaped leaves that flutter in every breeze hide the light gray bark in a shimmer of green. It is at this time that the birds come to nest amid them—yellow warblers, Arkansas kingbirds, Bullock's orioles, robins, gold-finches and western mocking birds. The magpies, too, like to build in their branches, while the blackbirds use them for concert halls, and squirrels sleep in holes that the flicker has made.

The western cottonwood is scattered from Alberta, Canada, south through Dakota, Wyoming, Nebraska, Kansas and Colorado to New Mexico. There are many other kinds of cottonwoods in the West—the Mexican and Fremont's in the south, Tweedy's and the lance-leaf in the North and the narrow or willow-leaf in the foothills—but to most of the plains folk, the western cottonwood surpasses them all.

PLANTED BY THE PIONEERS

This handsome cottonwood represents untold effort on the part of early settlers to insure its growth

In one park near the Platte River, where some of these typical old monarchs are being preserved, stand many rugged "first inhabitants" that were large trees when the Indians camped along the river and herds of bison fed on the plains. One of them, which is true to the cottonwood type, measures thirteen feet, two inches around the trunk two feet from the ground. Another, which has weathered many storms, measured twenty-one feet about the trunk. Such trees are not unusual.

There are many trees that are more beautiful, more valuable and larger than this cottonwood, but perhaps none has earned so complete a place in the hearts of those whose ancestors settled the great West.

A FOREST HOBBY

TRACY V. BUCKWALTER RECREATES A MOUNTAINEER HERITAGE

BY BURTON BARON COLMAR

Another story in the series on the interesting nature hobbies of interesting people

BLACK walnut, red oak, sugar maple, white ash, tulip-poplar, black locust, basswood, Norway spruce, pines, pines and pines—when all these were set out near Canton, Ohio, more than ten years ago, to become the hobby of Tracy V. Buckwalter, they also took their unrivalled place as the largest reforestation project in Ohio. This forest-in-the-making, covering the majority of one hundred and seventeen acres, was planted by Mr. Buckwalter in his spare time during several years, aided by his sons and others. Vice-president of the great Timken Company, the planter is widely famed as an inventor and engineer. He lives half a mile from his trees, and also maintains two large tracts of pine, cypress and oak timber in South Carolina.

"Long ago it struck me," declared Mr. Buckwalter, phrasing his own view-point, "that one's best genius is intimately interwoven with not only what one may call natural living but with the life of Nature herself, and that by rule of Nature alone does he really consummate his finest potentialities. I think that the love of Nature is inborn in varying degrees in us all and that only perversions of one kind or another cause its stunting and death, as they unfortunately do in so many of us. In terms of what I have realized since I've been enabled fully to indulge my lifelong urge for communion with Nature, I know that had I gone contrary to this force, I should certainly be lost to most of the perceptions and conquests that are the finer possessions of happy men and women. It is not widely enough realized that such a desire, once satisfied, furnishes the key to the best-rounded self-development. But I was hardly aware of this when I acquired the land with intent to plant; I was then thinking chiefly of the cool breezes, the healthful sun and the miraculous way they have of freshening the body and soul, and of open-air field work, particularly as all of these would benefit my six boys. Mother also wholly favored the idea. Then, too, I have strong feelings about the conservation of our resources and now the boys feel as I do on the subject. But, more important to them, they begin fully to appreciate the strength that comes from working with Nature."

TRACY V. BUCKWALTER AND MASCOT
Below he is seen standing by a tree planted on his reforestation project

In his profession Mr. Buckwalter has won a great reputation for his effective research work and designing in the field of mechanical science. Having made the first electric baggage truck and the electric tractor, organized the country's first taxi service at Washington, consulted during the war on army truck building, he left his position with the Pennsylvania Railroad to become, after

1916, a prominent factor in the growth of the Timken Company. There he has managed the development of automotive and industrial equipment bearings and conceived the well-known roller bearing locomotive. Born in the Alleghenies fifty-one years ago of people who came from Alsace originally in 1706, he grew especially fond of all the wild children of Nature, travelling and studying widely. He was ever ready to carry the story of the outdoors to troops of Boy Scouts, and has thrown his forestry plantation open to people interested in Nature.

"This is something more than the accumulation of wealth!" Mr. Buckwalter exclaimed, smiling, as he led me between the two long circling rows of ten-foot Scotch pines bordering the entrance to the plantation. The detail of maintenance Mr. Buckwalter explained to me as we walked among young trees that almost everywhere overtopped us. As we walked to a second and larger woods, Mr. Buckwalter said he could there point out fifty different varieties of trees.

"I can readily visualize Thoreau vegetating among the Walden forest paths and greeting many leafy friends by their special characters he knew so well. I do likewise with these serene companions here. It is really too good to know them for what they are. Some of these, that gallant pin oak there, the towering American elm by the edge of the woods and a pair of tulip-poplars further along, are first prize trees, according to Mr. Secrest, the State Forester.

"Try to feel the spirit of these great Pagans—together they make what Stevenson called 'a city of Nature's own'. It is not alone the physically fortifying smell and atmosphere of many trees nor the mysterious attraction—due to primeval kinship, I think—that they have for men, especially the harassed, that are important. Most significant is their purging influence and the almost worded philosophic impressions they convey. Perplexed man enters the forest and forgets the world's great struggles. Come back into the world, he seems to have a fitter sense of what and how things might be—and why. He seems to absorb the very essence of ideals of equity, loving unselfishness and well-directed courage and feels delighted to do more than his share. Insight into the heart of Nature gives him that which chiefly marks the great man.

"The great speaking lesson of this tree-and-Nature-hobby is that we are a part of the vision and mosaic of Nature rather than of passing dogmas and civilizations and that we must abide by that great Mother's precepts if we are to know our fullest and most joyous conquest."

• • •

JUAN'S PET

HIS DEATH WAS MOURNED

BY D. C. RETSLOFF

JUAN AND HIS BOA
The Colombian was proud of the mousing ability of his household pet

IN THE South American country of Colombia the boa is considered a member of the family. He is a natural mouser and far better than the ordinary house cat. He likes to be petted and enjoys having his back scratched with a stick. He has no poison fangs and when he once attaches himself to a family, he never deserts them.

A large boa measures from twelve to fourteen feet in length. In Colombia the house boa swings from the rafters under the palm-thatched roof in the daytime and with his beady black eyes watches all that takes place in the room below.

At night he occupies the floor in the vicinity of the kitchen where he has more of an opportunity to catch the rats and the mice so common in the native houses.

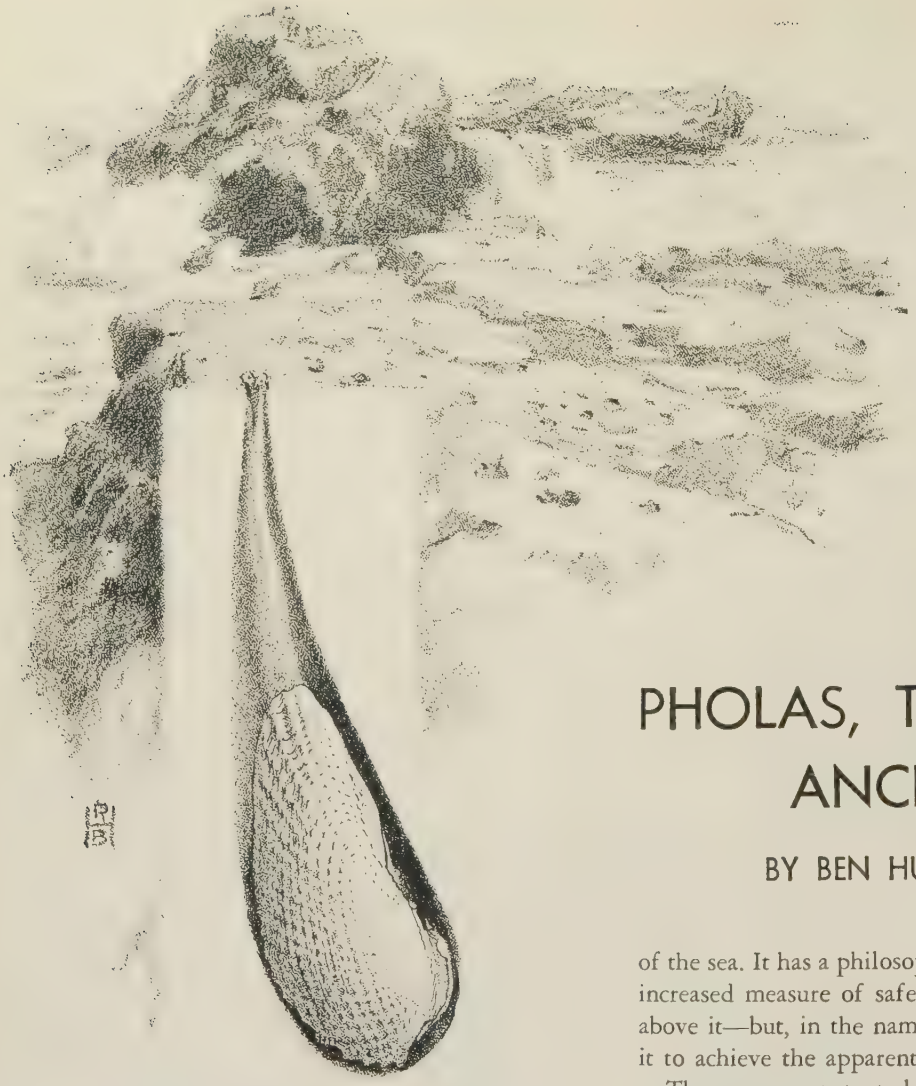
The boa here pictured was injured by a dog and had to be killed. Juan Jovellanos, the old man to whom the snake belonged, lamented for weeks over the death of his pet.

When Juan was a young man he was known far and near for his ability to handle snakes. In telling how to do it he says, "Feed the snake 'til he is so full he can't eat any more. Then he will get sleepy and that is the secret."

In handling a snake Juan grasps it at a certain place where the head can be guided and held from the body. That seems to be the hardest thing to learn and really only comes with long practice.

It takes both dexterity and strength to handle a boa that has not been tamed. Most of the snakes handled by professionals are harmless so far as poisoning is concerned.

The boa has no bad habits and persons accustomed to them pay no more attention to them than we do to the common house cat. Perhaps you'd like a little boa for a pet.



"YOU MAY BEAT LUSTILY AND SHREWDLY AT THE DONJON-KEEP OF PHOLAS . . . BUT STILL YOU SHALL NOT KNOW HOW THEY CAME TO BE WHERE THEY ARE."

PHOLAS, THE ARTISAN ANCHORITE

BY BEN HUR LAMPMAN

THE SEA flings aside so many apparently eccentric trinkets, of such novel and whimsical design, as to cause one to wonder anew at the persistent patience of those seekers who have read each riddle and ascribed to it a place in the volume of life. For our ocean is more than commonly mysterious, after the habit of sorcery, and moreover she toils in the darkness of her own tides —and what she does there, none may say, unless he is content to watch and wait, and nourish a curiosity as eager as a child's, and both exercise and restrain his fancy. In time, if he is very faithful and prudent, he shall have his answer.

The riddle of the bivalve mollusk called Pholas, that penetrates most obdurate rock and has its habitat and prison in the cold heart of the stone, still perplexes many of those who walk the beaches on either shore of the continent. How did the shellfish gain entrance to a substance that is without rift or fissure, and that yields fire when the heavy pick assaults it? The creature lies snug in its cavern, modeled to every detail of the occupant, projecting its siphons through the smooth, circular tunnel that so closely suits the diameter and length of these tubes, and thus takes tribute from the microscopic life of the sea. It has a philosopher's retreat, and a remarkably increased measure of safety from the hunger that hunts above it—but, in the name of Mother Ocean, how came it to achieve the apparently impossible?

The more competent observer, you may be sure, readily surmises that as a juvenile this enterprising homeseeker actually bored its own way into the rock, by means best known to itself. And, persuaded of this, he will have nothing to do with the head-wagging of the credulous, who are as one in acclaiming the matter a miracle. Science herself agreed with the observant layman from the first, but was at loss to prove the theory—for Pholas in its colonies frequents the worn ledges that lie, at a level with the restless sands, where breakers ordinarily are active. It is only at the lowest tides that these ledges are revealed—only at the pause and turn of the lowest tides—and the circumstance is not favorable to study. You may see the fleshy tips of the siphons protruding from the castle of their masters, and may note how instantly the siphons are withdrawn when the rock is struck. You may beat lustily, and shrewdly, at the donjon-keep of Pholas, until the pick is blunted and the arm wearied, and bear away fragments of the rocky habitat, each honeycombed by the creatures and displaying them in their close caverns—but still you shall not know how they came to be where they are. For the tide will be at your ankles, and the returning spray will be in your face.

Yet the young Pholas, after its larval season as a free-swimming creature, does bore into the rock, as leisurely

observations in aquaria have shown. Having chosen its station the infant mollusk wears away the stone by constant turnings of its shell, utilizing the anterior edges of the valves as cutting surfaces. You have but to choose a shell at random, from the many that litter the beach, and undertake in an afternoon to create an indentation in the rock, if you would comprehend how toilsome are the labors of Pholas. The creature, however, is tireless, and it delves down to the heart of the stone, leaving behind it the tunnel of its passage, and there it continues without remission the toil it is ordered to pursue if it would survive. For with growth,—and growth is constant until it is portly and mature,—Pholas must enlarge its dwelling repeatedly. The lips of its shell are evidence of this unremitting labor, for they are stained with the silt expelled by the mollusk from its self-created cavern. So closely does the rock press it, however, and so moderate are those movements which wear away the stone, that each detail of its pattern is often observed to be impressed in the rock.

A fragment from the ledge, bearing its quota of tenants—that sometimes are called "rock-oysters," though manifestly they are clams—is of rich interest. There Pholas is revealed in its retreat, like some fat merchant that lies in wait for trade, but may not venture beyond his booth. The tunnelings run at many angles, and it is plain to see that each creature, in its progress through the rock, has somehow taken thought of the activities of its fellows. For the tunnels do not cross, nor break into one another, though sometimes the dividing wall is thin. And never do the caverns, with their tenants, encroach upon the territory of another; and the same is true though an occupant may have given up the ghost, and left his whitening shell to the worm, or to minor clams that know a safe haven when they have found it.

Mollusks that tunnel into difficult materials are not, however, by any means unusual. There is, for notorious example, the destructive Teredo, called the ship-worm—and most wormlike in appearance—which penetrates and riddles the pilings of wharves and the timbers of ships, and for whose discomfiture man has devised a score of more or less effective devices. The Teredo does, as with certain wood-boring crustaceans, dine upon the fiber it destroys, but it also gains food from the sea, through its incurrent siphon—it weakens a stout piling effectually by relishing every millimetre of its way. But Pholas is the first of all these artisans, for it works in stone, often of a flinty hardness, this animal whose tissues are soft to flabbiness and whose shell is fragile as thinnest china.

On the west coast, at least, there is a prospect of eventual extermination for Pholas, since it is prized as a seafood, having its common name of "rock oyster" from its station and its delicate flavor. If there are colonies that lie well to sea, and are not bared at zero tide, it will survive—for it is amazingly prolific. But people with picks, and hungered for ocean fare, must soon wear down the last exposed snags of those rocks that were the foundation of vanished headlands. And when this takes place, if it does, they who walk the beach will be uncommonly perplexed to account for the riddled debris of Pholas' former home, as these memorials are shifted by the sea and worn to silt by the poundings of the surf.

• • •

AN AFFLICTED WHITE OAK . . . BY W. E. THARP

THIS white oak was found in the woods near Safford, Dallas County, Alabama. The size of the tumerous growth is indicated by the trunk diameter just below, which is about eighteen inches. The height of the tree is about thirty feet. The burl encircles the trunk, but is not well developed on the opposite side. The bark and foliage of the tree has an unhealthful appearance, and doubtless is affected by this abnormal growth.

To the U. S. Forest Service we are indebted for the information that the cause of such enlargements is not thoroughly understood. Presumably the growth develops as the result of stimuli from attacks of insects, bacteria, fungi, or from mechanical injuries. The gall insects inject a liquid, probably like formic acid, that stimulates cell division, but ordinarily the reaction of the tree to such injury ceases long before an enlargement like this one is achieved.

I have seen several other oaks and one walnut tree with similar rough enlargements of the trunk. They are occasionally found on long leaf pines, and I recall two trees about 20 inches across the stump that had so many large, rounded excrescences all the way to the lower limbs that there was much resemblance to an absurd design in totem poles.

MOTHER BLUE GROUSE BECAME FRIENDLY
She did not appear alarmed when sought for picture purposes—reason, some chicks

THE BLUE GROUSE OF MONUMENTAL

HOW THEY "ADOPTED" A SET OF HUMAN FRIENDS

BY JAMES W. MARTEN

ILLUSTRATIONS BY THE AUTHOR

WE CALLED them our chickens—these seven youngsters of a blue grouse mother that made their home near the lookout cabin on Monumental Mountain. This mountain is near the Idaho-Washington line only a few miles south of the Canadian boundary. It rises to an elevation of about 6000 feet, and is one of the lower peaks in the Kaniksu National Forest.

The discovery of the younger members of the grouse family was accidental. I had seen the hen several times, but always at a distance. One forenoon I started at my task of back-packing the supply of fire wood from the foot of the hill up to the cabin. Out of the grass behind a boulder walked a blue grouse. She did not appear at all alarmed. Almost my first thought was, "Here's where I get a real picture." Quietly backing away to a little distance I turned and ran for the cabin to get the camera.

"Bet she'll not be there when I get back," I thought. This was a guess based on previous attempts to photograph grouse. But when I slowly approached the place again, camera in hand, there she was. Since the bird did not seem alarmed I continued to move nearer, till I thought surely that she would fly.

When a tiny bit of gray fluttered out of a grass clump at my feet I understood the reason for the hen's lack of fear. There was a chick! By moving around carefully watching the angry movements of the mother and the stirring of the grass I soon scared out two more tiny birds, and with a quick clutch I captured one. How tiny it was! Just a wee bit of beating heart, two beady eyes in a fluff of brown and gray down. It was so frightened!

The chick was evidently quite young, if one were to judge by the size, yet the wings were feathered, so that short flights could be made. This I had found out as the balls of gray had scuttled and fluttered away in the grass at my steps. When I put it to the ground it dived into a tuft of bear grass and although I knew that it was in a circle of grass not more than a foot in diameter I could not at once pick it out with my eyes, so perfectly did its coloring blend with the surroundings.

Was the grouse mother far away during all this time? She was not. She was giving a perfect imitation of a farmyard fowl whose chicks are being molested. She stormed and clucked right at my feet. When I backed up she followed me, a picture of indignation, tail spread like a turkey cock's, wings drooping to the ground, at times half-raised to the side as she made a vicious dash at me. Each feather was raised and she seemed to be doubled in size. When again my picture taking came to mind and I began to plan positions she made an unusual problem. It was not to get close enough, the trouble was to keep her far enough away so she would be in focus. Only when I moved away from the spot where her chicks were hidden did she leave off the attack.

In the days that followed the grouse family were

frequent visitors around the rocks near the cabin. Insects were abundant there and in the early morning just after sunrise I would see the hen and the chicks getting their morning meal. They showed no signs of fright. On mornings after we had had a visit from the pack train they would be in the dooryard for the oats the mules left.

We took a personal interest in the grouse, and it was a real pleasure to show a chance visitor how tame they were. When such a person remarked, and most of them did, "Why don't you have a mess of chicken some day?" it usually caused an indignant answer that we were there to protect the birds as well as to guard forests.

• • •

ALL FOR A FLOWER

BY RALPH KROWS

"IT BLOOMED BETWEEN HEAVEN AND EARTH"
Doing its best to brighten a community of sooty roofs in the heart of the city. The inset shows the flower in its wall cranny

In my second reader back in grammar school days there was a thrilling story of a brave Swiss lad who, tormented by his sweetheart for that rare mountain bloom, the edelweiss, scaled perilous cliffs in search of it. He was almost at his limit of endurance when, at dizzy heights, he found a resplendent blossom—but, alas, just as he plucked it, the rock under his weary feet gave way, and he plunged to his death, the flower clutched in his hand.

This story was read, marvelled at and promptly forgotten at the tender age of seven, but when, one morning last year, I felt the slippery roof of a three story building sliding out from under my feet and tobogganing camera, tripod, plate holders and myself toward the cement pavement, the tale flashed back into my mind like the past does to a drowning man. With it came the curious thought that the only difference between me and the Swiss boy was that I had scaled the heights for a flower under no sweetheart's impulsion. There would be no second reader to commemorate my fate, but the newspapers might carry a brief obituary politely intimating that anyone who would risk his neck on a dormer window roof solely to take a photograph of a fireweed flower was little short of a maniac.

After a frantic scramble, however, my rubber-soled shoes caught a cleat at the gutter's edge, and the rapid descent toward the center of gravity ended. My next essay of the glass-like dormer window roof was successful, and the specimen of *Epilobium angustifolium,* otherwise known as the fireweed, now peacefully rests in my album, while the expensive camera, tripod and plate holders, borrowed for the occasion from a friend, are safely back in their owner's hands.

It was while obeying the injunction of the philosophers and casting my eyes upwards that I discovered, one day, my flower growing out of a crevice in a bare brick wall forty feet above the street, doing its best to brighten a community of sooty roofs and crumbling chimneys. Just as I saw it, up came my learned friend Griggs, who bubbles over with long-sounding Latin names for all that grows and blossoms. "Huh!" he said, "*Epilobium angustifolium!*" "How about fireweed?" I suggested. "Both correct," he gravely nodded. So I went off to borrow the camera and equipment and to risk my neck.

When I think of that sturdy plant roosting so jauntily between heaven and earth, far from its companions and its native habitat, and then remember all my barren efforts with prepared soil and choice seeds, I alternately marvel and rage. But as I have said, I now have the skyscraper dweller in my album, and another difference that has sprung up between myself and the Swiss boy is that, I say happily, I am still talking about what I have done.

This article is another of the series on birthstones written for Nature Magazine by Mr. Pohndorf, Colorado gem expert.

AGATES AND MOONSTONES MAKE UP INTO A VARIETY OF ATTRACTIVE AND INTERESTING BITS OF JEWELRY

They have the added attraction of being as inexpensive as they are varied and attractive

GEMS OF JUNE

THE AGATE AND THE MOONSTONE

BY AUGUST POHNDORF, JR.

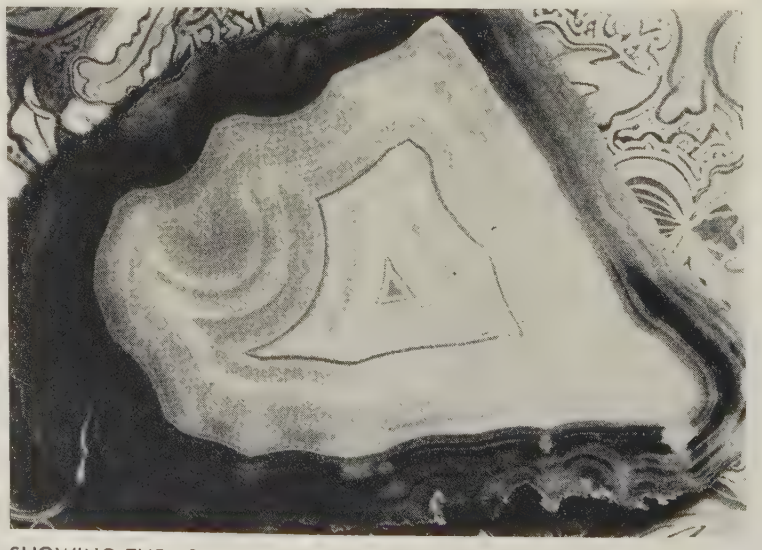
THE RICHLY banded agate, credited with alleviating pain, and the milky white moonstone, which, if held in the mouth, aids memory, are the stones to be worn by those born in June.

Agates are chalcedonies, which means that they are a variety of quartz, characterized by bandings and inclusions which give them a handsome, rich appearance. The markings may be parallel or eccentric stripes, or star-like radiations, or plant-like inclusion of the oxides of iron and manganese. They may appear in varying shades of blue, gray, white, yellow, brown, red or black, and all the possible combinations offer great diversity to the person selecting this jewel.

These stones are usually found in rounded boulders having the appearance of being built up, layer on layer, by a master craftsman. Others have a concretionary formation—that is, they are one concrete mass—and when cut in a thin section and polished, give a beautiful cumulus cloud effect if held against the light. In hardness both types rank slightly under 7, and they have 2.6 times the weight of water. Both have a waxy, glass-like luster.

The many types of agate have given rise to distinctive names. Onyx is the flat, parallel-banded variety chiefly used for fine duo-tone cameos and intaglii. Ribbon agate shows a banded, concentric structure. The fortification, or Ruin variety is that which shows the angular character of the ground plan of a fortress or an aerial view of a ruin. Moss agate, sometimes called mocha-stone or scenic agate, is a more or less transparent chalcedonic quartz in which iron or manganese oxide has painted scenes resembling sometimes landscapes, sometimes mosses, and sometimes star-like radiations. The principal sources of this variety are Colorado, Montana and Wyoming. The finest onyx and ribbon types come from the provinces of Minas Geraes and Rio Grande do Sul of Brazil; Uruguay; and in the United States, the Rockies, particularly the Colorado Rockies, and Lake Superior region. Mocha-stones are the fine Indian moss-agates that came originally from Mocha, in Arabia. All agates are reasonably priced, varying from $.50 to $3 per stone, and from $3.50 to $150 for agate slabs and dishes.

Pliny, who seems to have known a lot that was not true, tells of one of the most marvellous of the agate markings: "Next in note . . . is the jewel that belonged to another king, Pyrrhus, who was so long at war with the Romans. It is said that there was in his possession an agate upon which were to be seen the Nine Muses and Apollo holding a lyre; not a work of art, but the spontaneous produce of Nature, the veins in it being so arranged that each of the Muses had her own peculiar attribute."



SHOWING THE FORMATION OF AN AGATE

It looks not unlike an airplane view of a walled fortress of ancient days

He is also responsible for spreading the notion that this stone was good to alleviate pain caused by the bites of spiders and scorpions and that it also helped the eyes. Held in the mouth, it was supposed to allay thirst.

In Persia, agates were burned to deviate hurricanes and tempests and to stop the course of a river. The Europeans of the Middle Ages took from them the additional belief that wearing the stones gave and preserved strength, made the wearer gracious and eloquent and prevented all scrofulous skin troubles. The spreaders of this legend may have had their tongues in their cheeks, however, for a part of the prescription was to fasten the stone to the body by means of the hairs of a lion's mane. Anyone who went out to get hairs for this purpose was liable to find that his troubles—and himself—were swallowed up by the lion.

The moonstone may be any one of several slightly different kinds of feldspar, which are complex silicates. True moonstone is the translucent or transparent variety of adularia, a potassium-aluminium tri-silicate, and is distinguished by its milky white opalescent color which sometimes evanesces a light blue. It is 6 in hardness, and 2.55 times as heavy as water. Its luster is pearly. In value it varies between $1.25 and $5 a gram, or five carats.

Albite, the sodium-calcium silicate, and oligoclase, a similar substance, furnishes a stone almost identical to the adularian moonstone.

The first moonstones of recent times were from Mt. Adular in Switzerland. The best specimens now come from India, although it is found, but less fine in quality, in other parts of the world.

It was believed that if a moonstone was carried in the mouth, it greatly aided the memory. During the increase in the moon it was a potent love charm, and during the wane it enabled the wearer to foretell the future. Truly the individuals born in June, the month of brides, should have little to complain of in their choice of birthstones and can have one of them at slight cost.

• • •

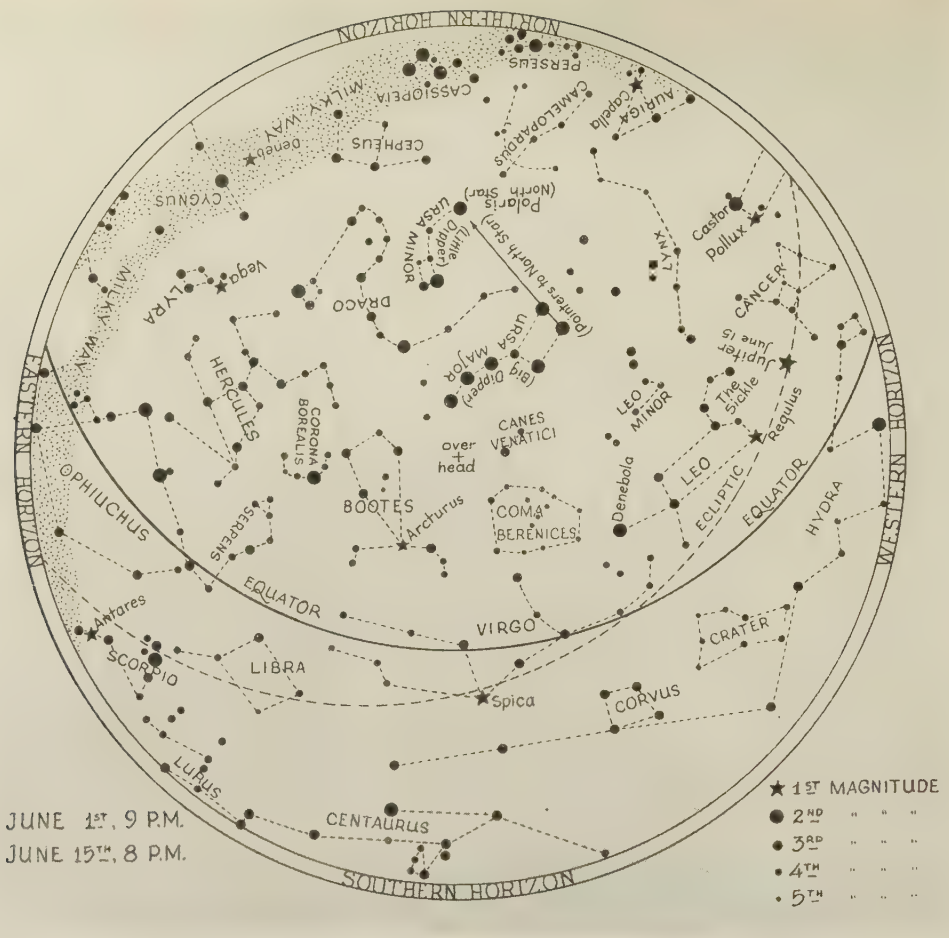
BALSAM OF PERU

BY GRETCHEN SMITH

In tropical America there are several varieties of balsam, variously useful. Perhaps the best known, however, is the Balsam of Peru. Although it is usually referred to thus, actually the medicinal product of this tree is one of the outstanding exports of Salvador. The tree is a native of the Balsam Coast, a tract on the Pacific Coast of Salvador, but Peru got the credit since most of the shipments were made by way of Peruvian ports.

The balsam grows to about one hundred feet and is valuable for its wood as well as its medicinal gum. The value of this product was known to the natives and appreciated by the Spanish conquerors. The tree matures in about its twenty-fifth year and although plantations have been set out, most of the product comes from the wild tree. The gum is gathered by natives who have cultivated the skill necessary to cut the tree to extract the juice most effectively.

The natural attractions of Salvador are numerous. Tourists disembarking from Grace Line steamers at La Libertad enjoy the good roads of the interior country and the scenery of lakes, wooded mountains and smouldering volcanoes. Not far from the capital, San Salvador, is the Izalco Volcano which about 125 years ago rose out of the plain and gradually attained an elevation of nearly 6000 feet. It is now almost continuously active and every few minutes with almost clocklike regularity it sends forth a dense column of smoke, which gradually fades away, passing off with the clouds, but providing an interesting phenomenon.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south

HOW THE STARS ARE COUNTED

BY ISABEL M. LEWIS

WHEN, on a dark, clear night, one looks at the glory of the skies it seems as though the stars in the heavens were infinite in number. Those that one sees with the naked eye appear countless, and one thinks of the billions only to be seen with the aid of a telescope. In truth, however, there are less than 3500 stars to be seen with the unaided eye at any one time and place and under the best conditions.

There are in the entire celestial sphere between six thousand and seven thousand stars that are distinctly visible to an average eye without a telescope. Since only one half of the celestial sphere can be in view at any one time only one half of this total number can be seen at any one time and place. If, in addition, there is moonlight or considerable haze in the atmosphere the number visible will be further reduced by fully one half again. The fainter stars, which greatly exceed the brighter in number, are invisible close to the horizon because of excessive haziness of the atmosphere at low altitudes. Under average atmospheric conditions there are probably not more than 2000 or 2500 stars clearly visible to unaided vision at any one time. The limit of naked-eye visibility is about the sixth magnitude. The unfortunate star-gazer who attempts to view the heavens under the glare of city lights, or even from an apartment house roof, finds even this small number tremendously reduced. He is lucky if he can see stars fainter than the fourth magnitude, while the Milky Way is a sad sight from city streets, if it is seen at all.

There are by actual count 530 stars brighter than 4.0 magnitude visible to the eye. Photographically the number is considerably less because the excess of red light in many of these stars makes them photograph fainter than they appear on the visual scale and so they are classed with stars of fainter magnitude. Among fainter telescopic stars the difference between the number of visual and photographic stars for any one magnitude increases very rapidly because the fainter stars average redder.

There are about 1100 stars between 4.0 and 5.0 magnitudes, and 3200 stars between 5.0 and 6.0 magnitudes. While the stars brighter than 4.0 magnitude may be counted on to be visible even when the seeing is poor, or there is moonlight or city lights to dim them, they are only 530 in number while the stars between 4.0 and 6.0 in magnitude total about 4300.

When we come to the hosts of telescopic stars we find that other methods of getting star statistics must be adopted. It is, of course, impossible actually to count the billions of stars in the heavens even were they all within reach of our more powerful telescopes. Years ago Herschel selected a number of regions in the sky and made an estimate of the total number of stars from actual counts in these selected areas. Later Kapteyn chose 206 regions uniformly distributed over the sky and suggested that leading observatories cooperate in finding the number of stars, their magnitudes, motions and the like in these areas. Much more information has been derived from such statistical methods of studying the stars than might be imagined.

The faintest star visible in a one-inch telescope is a star of the ninth magnitude while a four-inch telescope should show stars of the twelfth magnitude. The Yerkes telescope, which is forty inches in aperture, will just barely show stars of the seventeenth magnitude. The photographic limit of a telescope with long exposures is much fainter, but stars of the twenty-first magnitude have been photographed with the 100-inch Mt. Wilson reflector. How many stars, one may ask, may be seen with the aid of the greater telescopes in existence, and how many stars is it estimated cannot be shown by these telescopes because of their excessive faintness? As to the brightness of these faintest stars it may be recalled that a star of the twenty-first magnitude gives only one one-hundred-millionth of the light of a star of standard first magnitude.

With even the smallest telescope the number of visible stars is enormously increased. A field-glass will show about 50,000 stars. Argelander in making his Durchmustering of stars from the north pole to two degrees south of the equator observed 324,000 stars with a two and one-half inch telescope. It is estimated that there are more than one hundred million stars within reach of the forty-inch Yerkes reflector and more than a billion that can be recorded photographically with the 100-inch Mt. Wilson reflector with long exposures. From counts of stars on photographic plates, 300,000 in selected areas and 1,400,000 in the Astrographic catalogue, it has been estimated that there are about 890,000,000 stars down to the twenty-first magnitude that are visible photographically in the most powerful telescope.

It has also been estimated on the basis of such representative star counts and from extrapolation of results that there are one billion stars brighter visually than the twentieth magnitude, although our telescopes are not powerful enough to show the faintest of them.

It has been found from star counts in selected areas that the number of stars is rapidly increasing with the increasing magnitudes. For example while there are fifteen million stars brighter than 15.0 magnitude there are thirty-three million brighter than 16.0 magnitude. This means that there are more stars between 15.0 and 16.0 magnitudes than there are stars of all the brighter magnitudes combined. This increase in the number of the fainter stars keeps up even down to the limit of visibility of the most powerful telescopes, showing that there must be billions of faint stars still beyond the range of our greatest telescopes. That there is not an infinite number of stars, however, is shown by the fact that there is a definite limit to the amount of light that we receive from all the stars together. This combined light has been found to be equal to that of 1092 stars of magnitude 1.0. The fainter stars contribute very little to it and one-fifth of it comes from stars brighter than the sixth magnitude and so visible directly to the naked eye. It is believed that there is very little, if any, extinction of light in space; that is, that space is practically transparent except in the regions where obscuring dark nebulae are known to exist. So the star-light that reaches the earth is that of all stars combined, whether visible in our telescopes or beyond their reach, with the exception of the light shut off by obscuring dark nebulae.

Some interesting conclusions have been arrived at by Seares and van Rhijn on the approximate numbers of stars in the heavens, using star counts in selected areas as a basis for their deductions. At the limiting magnitudes for our telescopes the stars are still rapidly increasing in number. Allowing for this and noting the rate of increase they estimate that, roughly, the total number of stars, including those beyond the reach of our telescopes, must be about thirty billion. It is well known that the number of stars of all magnitudes increases greatly toward the Milky Way, or Galaxy. According to the estimates of Seares and van Rhijn the number of stars too faint to be seen in any existing telescopes is three times the number of those visible telescopically in the regions farthest away from the Milky Way, that is near the poles of the Galaxy. In the Galaxy itself there are seventy times as many stars beyond the reach of existing telescopes as there are within their reach. These conclusions are arrived at by extrapolation of results obtained from star counts in selected areas and are supposed to be only a rough approximation to the truth. The total number of stars on this basis, including those beyond the reach of our greatest telescopes, is of the order of thirty billion.

In June the Milky Way is not conspicuous in the early evening as it lies close to the eastern horizon, extending from Scorpio in the southeast through Ophiuchus, Aquila and Cygnus to Cepheus, Cassiopeia, and Perseus in the north. Leo is now in the western sky and Hydra extends from a point near the western horizon below Leo and Virgo to the meridian. Arcturus in Bootes is on the meridian due south about nine P.M. on June 10. Due east of Bootes is the beautiful little circlet of stars known as Corona Borealis, The Northern Crown, and directly east of Corona is the huge constellation of Hercules. This giant sky-hero faces the north, kneeling with one foot upon the head of Draco. The constellation of

Draco is conspicuous at this time. It can be traced in a long, sinuous line of third and fourth magnitude stars from a point north of Hercules, first northward toward Cepheus, and then curving southward toward Bootes and finally westward between the two Dippers, the tip of the tail marked by a fourth magnitude star directly north of the Pointers.

Vega in the beautiful little constellation of Lyra is equal in brightness to Arcturus and these two stars are the brightest of the first magnitude stars now above the horizon. Spica in Virgo, southwest of Arcturus, and Regulus, at the end of the handle of the Sickle in Leo, are also first magnitude stars. Antares, The Rival of Mars, so named because of its resemblance to the ruddy planet, rises in the southeast shortly after nine P.M. early in June.

Among the planets, Venus is still visible early in the month low in the west but is rapidly approaching the sun. It will come into inferior conjunction with the sun on June 29 and will be too close to the sun to be seen for some days before that date. Jupiter is in the western evening sky in Cancer at the beginning of the month but passes into Leo on June 10. It may be seen about 30 degrees above the western horizon at sunset on June 15. Saturn rises in the southeast in Capricornus late in the evening. Mercury will not be well placed for observation this month. It is in the morning sky until June 13 when it is in superior conjunction with the sun. After that date it is in the evening sky but too close to the sun to be seen before the end of the month when it will set a little more than an hour after the sun. Mars is now in the morning sky and is coming into better position for observation. It is in the constellation of Taurus.

• • •

A SAD CASE OF INDIGESTION

BY CHARLES T. VORHIES

MOTHER NATURE, in the minds of many, is an all-wise and beneficent old dame, whose children are popularly supposed not to commit foolish blunders. Fish-eating birds uncontaminated by civilization occasionally choke to death on prey unwisely selected as to size or variety, however, and we frequently hear of snakes attempting to swallow the formidable horned lizard—the so-called "horned toad".

When reptiles do try to dine on the spiny fellows, not only death results, but, according to the tales, their heads are severed by the crown of thorns possessed by the lizard for just this purpose. The "toads" are supposed to make their escape by this means, presumably living happily thereafter.

A MEAL THAT WAS NEVER FINISHED

The rattlesnake attempted the impossible by trying to eat a horned toad. Both glutton and intended victim died

I have at last had the pleasure of verifying the fact that snakes do sometimes attempt the impossible, with disastrous results. In this instance tragedy befell both the predator and its prey.

In May, 1931, there was brought to me at the University of Arizona by Phil Bray of Tucson a small Mojave rattlesnake, *Crotalus scutulatus,* seventeen inches in length, which had attempted to swallow a horned lizard four inches in length. The lizard appears to be *Phrynosoma regale,* the regal horned lizard, common in southern Arizona. As shown in the photograph, the head of the prey lodged in the throat of the rattler, and the horns pierced the walls of its throat and neck. Three or four of the spines penetrated the neck completely. Dislodgment was impossible, and death was but a matter of time. Mr. Bray believes the lizard still showed signs of life when he found the specimens, but there is a chance of error in this observation which seems the greater to the writer because rattlesnakes commonly (but not always, in captivity) kill their prey before swallowing it. The snake was alive when found, although dead when it reached me. The photograph was taken at once from the fresh specimens.

That the head of a snake taking its prey alive might be severed by active working of the spiny head of the lizard does not seem probable in view of the firm lodgment, in this instance, of the spines in the muscles and skin of the snake's neck. But—*quien sabe?*

Elliott's Guaranteed TULIPS

SOLD WITH A MONEY BACK BOND

The World's Finest Tulips at Bargain Prices . . . Free Fertilizer . . . Order NOW ~ Pay next Fall~Offer Expires July 1 . . . Valuable Bulb Book ~ FREE

HERE is your opportunity to get the aristocrats of the Tulip Kingdom at a price much lower than is often charged for nameless, ordinary bulbs. Every tulip offered is in the Giant class, famous for its big, shapely, exquisitely colored blooms, its long, strong stems, its vigorous, sturdy growth.

60 Darwin and Breeder Tulips $3.15

COLLECTION A

6 CLARA BUTT . . . . . *Delicate Salmon Pink*
6 BLEU AIMABLE . . . . . *Mauve-Lavender, Lilac-Edged*
6 FARNCOMBE SANDERS . . . *Fiery Scarlet*
6 PRIDE OF HAARLEM . . . . *Deep Old Rose*
6 PRINCESS ELIZABETH. *Pink, Light Border*
6 BARONNE *de la* TONNAYE . . . *Vivid Pink*
6 BRONZE QUEEN . *Buff and Golden Bronze*
6 LOUIS XIV . . . . . *Royal Purple and Gold*
6 GLOW . . . . . *Deep Glowing Vermilion*
6 INGLESCOMBE YELLOW . . *Glossy Canary (Darwin Type)*

COLLECTION B: 100 Bulbs (10 each) $4.75

COLLECTION C: 250 Bulbs (25 each) $11.25

These 3 collections are Special Bargain Offers. They are not duplicated in our catalog. They must be ordered from this advertisement.

Carriage prepaid on all Collections Everywhere in the United States

WITH every order, we will send **FREE**, a liberal supply of Superfine Fertilizer and Soil Conditioner, made by us especially for these collections. This plant food will enrich your soil, and make your results better.

We guarantee that these bulbs are ***true to name,*** and have reached their full maturity, so will produce perfect blooms. We guarantee that they will grow in any climate and in almost any kind of soil. If you are dissatisfied in any way, ***your money will be refunded instantly.*** There are no strings to this Bond.

Our buyers must sail early in July to be certain to get the pick of the best Holland crops. ***YOUR ORDER MUST REACH US BEFORE JULY 1.*** October is planting time; we make no deliveries until then. We do not require payment until delivery time. ***IF YOU WISH TO SEND CASH WITH ORDER, YOU MAY DEDUCT 5%.***

FREE BULB BOOK: A garden grown from bulbs is a lovely, rich, aristocratic garden. For bulbs produce beautiful flowers. Read about a wonderful choice of Hyacinths, Narcissus, Tulips, Lilies, and many unusual flowers. Send for our Free Bulb Book; IT IS A FREE COURSE IN BULB CULTURE. For 43 years it has been the guide to those who grow the better kinds of flowers.

The Biggest Bulb House in the World

ELLIOTT NURSERY CO.
Fourth Street . . . Evans City, Pa.

Wild Flower Pictures, Seeds

2 new colored post cards 27c in addition to 8 colored postcards $1.00, 64 colored stickers or 8 trees 55c, 100 outline drawings 75c. Lantern ides and lecture 1 day $5.00. Motion picture 5.00 postpaid, free to chapters and affiliated soci- ies having lantern. 150 kinds seed, 12 packets 1.00. Arbutus 25c, fringed gentian 50c. Seed list nd literature free. Wild Flower Preservation So- ety, 3740 Oliver St., Washington, D. C.

RED IRIS BARGAIN

beautiful large, fragrant Irises: 3 light reds; 3 darker; 3 still ker; 3 very darkest reds. Also 2 highest scoring plants for mpt orders. All labeled. Postpaid only $1.50. Would retail 50. Full instructions, list of ten cheap collections and literature e. You will love these red beauties.

WELL IRIS FIELDS Box G CARLINVILLE, ILL.

Caring for Your Garden

Spring is here, and with it comes the urge to get out the garden tools and breathe into one's nostrils the smell of warm, freshly turned earth, to the end that the home surroundings when summer comes will be a joy to behold. There are many tricks to the trade of gardening, and a recent book to aid the suburbanite or country home owner appears to know them all. It is *Garden Maintenance,* by H. Stuart Ortloff and Henry B. Raymore, both landscape architects and dirt gardeners. In it, as the foreword points out, "you will find nothing of specious esthetics or vague discussions of harmony or the scent of Lilies in the gloaming," but you will discover how to make the soil just right for your plants, how to care for your shrubs, lawns, trees, and flowers and how to control your insect enemies and the diseases that inflict themselves on your plants. In short, it is a volume of practical, earth-earthy information which, if utilized, will crown the pleasure of gardening with the garlands of success. The Macmillan Company prices it at $2.50.

Poets and Gardens

As the editor of *The Garden Book of Verse,* William Griffith, explains in his introduction, only poets can interpret the spiritual side of the garden. It requires deeper insight and greater capacity for self-expression than most of us possess, to catch, in words, the fragrance of a rose or the spell of a garden at eventide. Poets, realizing the impossibility of ever fully portraying all the aspects of the garden, have continued, through the centuries, to write some of their most beautiful lines about it. *The Garden Book of Verse* is a collection of the finest of these lines. From Solomon to Edgar Guest, from Confucius to Edward Davison, all the poets who turned their varying degrees of genius toward the realm of flowers and plants are contributors to a literary feast. Extreme good judgment and taste in making the selections have been displayed by Mr. Griffith and his co-editor, Mrs. John Walton Paris, founder of the Federated State Garden Club movement in America. Especially closely have they hewed to the line, and overcome the temptation to add important poems which are not strictly garden poems. Both the garden-lover and the general reader will find the anthology valuable and interesting. It is priced at $2.50 by William Morrow and Co., New York City.

Books for Parks

The American Library Association, which is helping to build up libraries in the 23 national parks, has issued a call for volumes on natural history, park development and Nature to be distributed to these preserves. Both manuals and essays are welcome, and any type of literature pertaining to the fields covered in the parks will be appreciated. C. Edward Graves Librarian, Humboldt State Teachers College, Arcata, California, is chairman of the committee in charge of the work. Persons interested should communicate with him.

This is a worthy enterprise that NATURE MAGAZINE is happy to recommend to its readers.

THE ONE FERTILIZER FOR LAWNS

While we know for a positive fact that DRICONURE offers you more volume for your money than any other fertilizer, we want you to realize that it is also more effective in creating and perfecting plant beauty—

—beauty of symmetry
—beauty of color
—beauty of health and lasting vigor
—and lastly, *strength* for size and endurance

DRICONURE Activated Cow Manure and PEAT MOSS

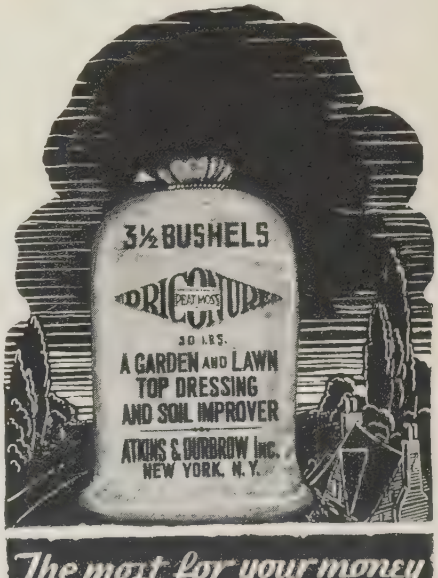
not only supplies the *right kind* of food in abundant quantities—but—its humus content gathers together sufficient moisture to dissolve this food and hold it in suspension until the grass or plant roots use it.

There is no waste . . . no leaching away . . . ***it will not burn.***

Try it. We will send you a 5 lb. trial package for 65 cents postpaid if you live East of the Rockies. From your dealer by the ton or 3½ bushel bag.

ATKINS & DURBROW, INC.
165-G John Street
New York, N. Y.

Also distributors of GPM Peat Moss



The most for your money

Best for your plants

Greenland Lake

There are no "year-round" lakes on the North Rim of the Grand Canyon and in the adjoining Kaibab Forest. One small basin, which contains water during a considerable part of the year, has consequently attracted considerable attention. It is Greenland Lake, near the road between Point Imperial and Cape Royal. The lake, according to Dr. Russell Gibson and Edwin D. McKee, the park naturalist, has no outlet nor inlet. Its basin is of the geological type known as a "sink hole", and is formed by the dissolution and removal of limestone by rain and snow water. Once upon a time, the basin was one of the many entrances to the ramified system of underground water passages which honeycomb the Kaibab limestone, but the outlet has become clogged up, and the lake forms every spring to revive with every rain and finally to dry up in late summer. It is a favorite with all visitors.

Oglebay Park Reforestation

Nearly one hundred and sixty thousand trees and shrubs have been transferred this winter from Oglebay Park's forest and nurseries and planted in permanent locations throughout Wheeling, West Virginia's well-known recreation ground. To accomplish this result, M. C. Hine, manager of the park, resorted to old-time barter methods. Oglebay Park's budget was slashed last year. Little money was available to move valuable nursery stock to the recently-created arboretum and to prevent it from overcrowding. So Mr. Hine arranged with commercial nurseries to trade labor for some of his plants and, in that way, secured the man power necessary to make a large proportion of the transplantings. Oglebay Park met the spring much more beautiful than before. The park contains 750 acres, and has more than sixty buildings, and was given to the city of Wheeling, West Virginia, by the late Colonel E. W. Oglebay.

A Fearsome Rider

Rocking-chair naturalists have always been deeply incredulous of stories of bobcats pulling down deer, so great is the difference in weight between the creatures. The ferocity and quickness of the cats are often more than a match, however, for the awkward strength of their victims. During February, two electricians at Yosemite National Park surprised a cat attacking a deer close to a highway. The cat was hanging tightly to the doe's neck while the frantic animal was striving to reach deeper snow, where its attacker would be more handicapped. Blood streamed from a wound in the deer's neck, and apparently she was badly hurt. The approach of the men caused the bobcat to attempt to escape, but it was cornered and killed. It weighed 12 pounds. It is believed that wildcats often leap on the backs of deer and ride them, seemingly with the purpose of tiring them out or getting them so excited that a kill is easy. Assistant Chief Ranger John Wegner of Yosemite Park witnessed such a trick in 1925. A four-point buck dashed down a highway along which he was standing with a cat on his back, his teeth fastened in the deer's neck and his claws digging deep into his flesh.

Learning to Drink

The benison of clear, cold water was brought home to an immature, untutored purple martin on one of the hottest days that Galesburg, Illinois, experienced last summer. Harold M. Holland, who snapped the above picture, saw a brood of the birds flutter down to earth from their home atop a pole one afternoon last July. It was as if they were seeking a cool spot about the nearby house. One, more venturesome than the others, embarked upon a short, uncertain flight and landed in a bed of flowers. Removed to the edge of a birdbath, it appeared to know neither the contents thereof nor their use, though openly manifesting a need for a freshening sip or two. A human interceded to let fall a few drops of water on its head, whence it turned its beak upward toward the friendly hand and opened its mouth wide to receive the welcome relief. Mr. Holland caught it in this interesting pose.

It's Hard to Believe

"With an apology to Mr. Ripley I want to give you another 'Believe it or Not'," writes Mr. Houston Wade of Houston, Texas. And with his letter Mr. Wade encloses a cancelled check for $59.90 made out to T. A. Binford, Sheriff of Harris County, Texas. Thereby hangs the tale.

The Wades are Nature lovers. So last year, in April, they erected an attractive martin house on their property and soon afterward it was occupied by a lively and lovely group of these apartment-house dwellers among the birds. They brightened the spring with their love songs and courtship.

"Along in the month of April," Mr. Wade writes, "these devoted little birds began to nest and hatch their young, which was an additional source of delight to us, for we watched them very closely.

"Then came the tragedy. Along in May one Saturday afternoon, while we were all sitting on the front porch watching and enjoying the efforts of Papa Bird and Mamma Bird trying to teach all the little birds to fly, we heard a rifle shot, and then we heard another and one of these dear little feathered parents dropped dead at our feet. He seemed to recognize us as his friends and seemed to make one last effort to reach us before he died. As he lay before us with his little wings spread in death, we looked up and beheld a vandal with his gun deliberately trying to exterminate our colony of martins for no reason except to practice his marksmanship and gratify his lust for blood.

"The State of Texas has a homestead law that is supposed to give a man the right to defend his home from trespass. The State of Texas has a law that is supposed to protect all migratory birds from destruction at all times unless they are classed as game. There is a Federal law covering the same point. There is a law in the city of Houston, Texas, a city that boasts a population of 200,000, that forbids the firing of arms within the city limits.

"Yet in the face of all this we were haled into the County Court at Law, Judge Ray Scruggs presiding, and fined the sum of $25.00 and costs, amounting all in all to $59.90, for the crime of defending the birds from the ravages of vandals. While we consider the money well spent, still we cannot help but be reminded of the quotation: 'Justice! the crimes that are committed in thy name!' "

Yes, it's hard to believe—an amazing commentary! We share Mr. Wade's indignation, both at the vandals and at the species of justice encountered. But, while we are not bloodthirsty ordinarily, we confess to curiosity about the paragraph Mr. Wade *didn't* include in his letter. We will freely admit we should like to read a paragraph giving in detail just what happened to make it worth twenty-five dollars, and costs. With this information we would then have the satisfaction of knowing that at least simple justice had been meted out even at the expense of the costly experience at the hands of official justice.

Pearson Pleads for Predators

A vigorous plea to sportsmen and farmers to distinguish between the beneficial and harmful varieties of hawks has recently been made by Dr. T. Gilbert Pearson, president of the National Association of Audubon Societies, who believes that the widespread prejudice against hawks and owls prevalent among many classes is responsible for much unnecessary destruction, and points out that the Biological Survey has shown that by far the greater number of our hawks and owls are much more beneficial than harmful, and play a vastly important rôle in helping to keep in check rodent pests.

Oysters for Anemia

The price of oysters is likely to follow skyward that of calf's liver if the belief of Dr. Paul Bartsch that the lowly bivalve will arrest the development of pernicious anemia is proved by experiment. The well-known authority on mollusks, a member of the Nature Magazine Scientific Consulting Board, is of the opinion that the high copper content of the oyster will check the ravishing disease that has taken so many lives and made liver-eating so highly important. He points out that if medical science verifies his theory, oysters will prove to be much more palatable than the present diet given sufferers. We suppose, however, that they will still have to go back to liver during the months that have no R's.

Those Southwestern Cactuses

In recent years, the cactus has become popular. Westerners, while still trying to grow in their gardens plants from foreign climes, have begun to realize the wealth of flora in their own back yards. Easterners have spent weary hours trying to make the desert plant behave and flourish in a setting far different from its arid plains. Apartment house dwellers cannot round out their existence without a cactus or two growing beside the radiator. Consequently the time is especially ripe for an authoritative and complete book on the numerous varieties of the family that is companion to the rattlesnake, sage and sand. The volume by John James Thornber and Frances Bonker, *The Fantastic Clan,* is indeed worthy of filling the gap in botanical literature. It is an extremely business-like and practical piece of work. Its well-written descriptions of seventy-five of the more important cactus species, decorated with the interesting stories of their use by the native plainsmen, will make a visit to the desert more significant and important, and will cause the gardener to yearn for the opportunity to include many of them in his next year's plans. The authors have the habit of finding a striking and memorable phrase with which to sum up a plant, thus making it easy to remember what they say. Wherever a species is adaptable to the home surroundings, they have given adequate directions for its care. *The Fantastic Clan,* with its popular style, its fund of information, its excellent drawings and color plates, will, we venture, find no lack of readers. It is priced by Macmillan at $3.50.

The Bird Book

To an imposing volume that combines the earlier *Bird Neighbors* and *Birds that Hunt and Are Hunted,* Doubleday, Doran and Company have given the title of *The Bird Book.* The selection of this title is, perhaps, unfortunate since it is the same as that given to a book written by Charles P. Shoffner and published by Stokes. The similarity of the books textually and physically ends there, however.

In this new edition of Neltje Blanchan's two earlier volumes, the publishers have given us a good bird work so far as combination of popular text with facts for scientific identification are concerned. The arrangement is good, the indexing—always valuable in such a work—entirely adequate and the typographical handling excellent.

In addition to a number of line drawings the publishers present 68 color plates. It is a mystery to us why, in view of the money they have invested in color, they were not willing to do a better job of this phase of their volume. Many of the color paintings are poor and reflect the fact that they were done from stuffed birds and by an artist not sufficiently well acquainted with the birds. Added to this many of the plates are utterly inaccurate as to color. Whether this is to be laid at the door of artist, engraver or printer is difficult to say from the finished work. Suffice it to say that the publishers might just as well have given the money spent for color reproduction to the unemployed. They have not added to the value of their volume by spending it.

The book is listed for sale at five dollars.

Rock and Hardy Plants

Because Then
You Can Be Sure of Your Bulbs

Reg.U.S.Pat.Off.

YOU have heard some say: "Oh, well, what is the use of ordering my bulbs now? I can get all I want next fall." To which you reply: "Yes, that's so, but you can't, then, always get all of the choice kinds you may want."

To which let us add, that you are absolutely right. Last fall we sold more bulbs than ever. Many of which were put-off orders. Put off so long in ordering that a large number of the selections were sold out, and second choice had to be sent.

We send all the orders of the looking-ahead wise buyers to Holland first week in July. Better get yours to us not later than then. Send for the catalog at once. Order at once. There's nothing gained by delay.

Wayside Gardens

38 Mentor Avenue, Mentor, Ohio
AMERICA'S FINEST PLANTS AND BULBS

Something for Nothing

You never got it? You will this time. I must dispose of my iris. Buy a little and I will give you much. The place in New Windsor is sold and I have already vacated the house.

My collection contains the world's best iris, costing up to $50.00. Some competent judges have adjudged *James Hudelson* the best iris in the garden. It is tall, vigorous, free bloomer, ageratum violet and blackish red purple, large, remarkable substance. Few commercial growers have it and list it at $15.00.

I have a lot of beauties, standard and new, worth 25c to $2.50, that were mixed in transplanting so I will not label them.

I will send 12 good roots of these and one Rosa Ring, "red", worth $3.00, for $1.50; or 50 of these and one Rosa Ring and one James Hudelson, both labeled, for $7.50 delivered.

Hand-pollinated seeds, best crosses, 400 seeds, $1.00. Cash with order, money back if oversold.

H. M. HUDELSON
South Plank Road Newburgh, New York

GIBSCO INSECT REPELLENT

GUARANTEED PROTECTION against Mosquitoes, Flies, Ticks, Chigres, Gnats and other insect pests. Kills Lice, Fleas and other vermin on dogs, live-stock and humans. Cures Ivy and Sumac Poisoning. Per tube postpaid..... 20c

W. A. GIBBS & SON, Inc.
Dept. WN-6, Chester, Pa.

Water Lilies

New beauty in your garden with a Water Lily pool. Gorgeous colors, exquisite fragrance—the easiest part of the garden to care for. **Complete Garden postpaid $3** Illustrated Booklet **FREE.** 40 pages of Water Lily lore. Tells how to make a Water Garden; care of Water Lilies. Many natural color pictures. *Safe delivery of orders guaranteed*

JOHNSON WATER GARDENS
Box B-N6 *Since 1876* Hynes, California

KILLS APHIS

APHIS (plant lice) and many other common insects which infest flowers, plants, shrubs, trees and vines are quickly and easily killed if you spray "Black Leaf 40."

Guardian of the Garden

Those who pride themselves on their beautiful gardens should never be without "Black Leaf 40." A convenient home size bottle is available. Kills insects both by contact and fumes, an advantage not possessed by any non-volatile, non-poisonous insecticide.

Also splendid for killing poultry lice. Just paint roosts as directed, and fumes will do the work. Sold by dealers practically everywhere.

Tobacco By-Products & Chemical Corp., Incorporated
Louisville, Ky.

Black Leaf "40"

115

DELPHINIUMS

We offer seedlings for spring delivery that will bloom the first year; second year make magnificent show. Only the finest strains of seed are used for these seedlings. By planting our seedlings, you can save four-fifths of the cost of the plants and get the best varieties.

12 One Kind

Delphinium, Kelway's Exhibition Strain. Internationally known. Awarded the highest prizes.
Delphinium, Blackmore & Langdon's Prize Strain. Nothing superior in Delphiniums.
Delphinium, Hollyhock Strain. Selected—very fine.

$1.

25 each of the above 3 varieties $5.00—12 each of the above 3 varieties $2.75

Aquilegia (Columbine), Mrs. Scott Elliott's Long-spurred hybrids, beautiful shades, 25 for $1.50. Seedlings replaced if they do not arrive in good condition. Complete list on request.

NORTH SHORE FERNERIES CO. Beverly, Mass.

What Mother Sees!

ORPHAN CHILDREN—**Turned away from overcrowded Orphanages and Children's Agencies.**

DESTITUTE MOTHERS—**At the end of their resources and unable to care for their little ones.**

OLD FOLKS—**Suffering in silence as the depression robs them of their support.**

HUNGER AND MISERY—**Among other mothers and children in isolated places beyond the scope of community chests.**

Few realize the extent and intensity of hunger and suffering in many remote communities and isolated places which are not and cannot be included in our usual Community Chests.

These have a legitimate call upon American Philanthropy. But only the intuitive insight of a mother's love can fully sense the acuteness of their needs.

Even though Mothers Day is past, what better way to honor Mother now than to care for some of these—our unseen neighbors.

In Honor of Mother—Help Other Mothers In Need

Whatsoever mother would do for a sick neighbor or a hungry child, do in her name for unemployed and destitute mothers and children who lack the necessities of life.

MY GIFT IN HONOR OF MOTHER
To The Golden Rule
Mothers Fund Committee
60 East 42nd Street, New York, N. Y.

I enclose.....Dollars for the GOLDEN RULE MOTHERS FUND, to be applied by the Committee where most needed, unless specifically designated below.

Signed.....

Address.....

This gift is to be recorded in the name of

.....

.....

and used for.....

Make checks payable to the Golden Rule Foundation
(4) marked for "Golden Rule Mothers Fund"

THIS SPACE CONTRIBUTED BY NATURE MAGAZINE

A Frozen Turntable in Old Vermont

A circular block of ice one hundred feet in diameter that constantly turned round and round in a whirlpool in the stream in which it lay, was one of the phenomena of the freak winter just passing. It was formed in one of the tributaries of the Connecticut River between White River Junction and Windsor, Vermont, and was discovered by R. B. Alexander of Hanover, New Hampshire, who photographed it. The ice began to form at the center and along the shore. During a series of several cold days a border was added each twenty-four hours until the block could scarcely turn. At the time it was photographed, it was making a complete revolution every twenty minutes.

ANT-LIONS AND PIT-FALLS

(Continued from page 355)

the time comes for its transformation. At any rate, about three weeks before the time of emergence, the larva is changed into the pupal stage. And, at this time a hole is made through the side of the cocoon by the occupant. At the end of the three weeks the pupal shell bursts; and we wonder if it can be possible that a creature so bloodthirsty and unsightly can contain within it the germs of such grace and beauty. Out of the shell of this fierce infant ant-lion comes a slender-bodied creature with the four delicate wings. At first its body is short. Then after the first few breaths of air it expands to three times its length and we have the insect in its perfect condition. The antennae have unrolled and the wings unfolded—wings that are a net-work of nervures, or meshes filled with glassy membranes, and that are sometimes more or less mottled with dark spots. In a short time the lovely insect is ready for flight, later to mate and lay the eggs from which the flat, wingless, pit-digger will hatch.

Ant-lions belong to the insect order Neuroptera. They do not all build pits or traps and some of them probably hide under stones and earth with the head and sickle-like jaws protruding—waiting for their victims to come within reach.

It is an interesting study to catch one of the pit-making species and keep it in a jar or glass of sand. Here it may be observed and fed with flies or ants. Eventually it transforms into the beautiful adult it so little resembles.

Elephant-Ears Run Temperature

The elephant-ear plant, the cause of friendly rivalry between growers in Florida and elsewhere, has much to warrant attention besides its big leaves. Francis M. Weston in the January issue described the unusual flower, and now Ernest H. Oesch of Davao, Philippine Islands, supplies the information that, during the first half-hour after the flowers open, the spadix has a fever. The fever comes only once throughout the life of the flower, and, while it persists, a subtle, penetrating musky perfume is given off by the flower and evidently is attractive to insects and bees. Writes Mr. Oesch: "Under natural conditions, these flowers open with the first streaks of dawn, and, from that moment until the sun's rays strike it, the spadix has a temperature of about 100 Fahrenheit. During the hot period, the spadix engages the attention of bees and other honey-seeking insects. After the spadix and single petal perish and drop off, the lower part of the spathe gradually curls back, exposing the seed stem covered with seeds about the size of a grain of corn. The seeds are eaten and scattered by a number of tropical birds." Mr. Oesch explains that there are a number of edible varieties of giant caladiums. Both roots and leaves are eaten throughout the tropical Pacific, and, in Polynesia and Melanesia, the roots are the staff of life.

The Varied Thrush

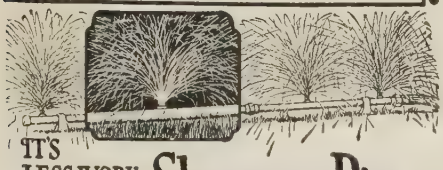
It is a red-letter day for the southern California bird student when he sees, during the winter months, a varied thrush, the robin-like bird that differs from the red-breast chiefly in the black crescent across the rusty breast, the orange wing bars and the orange line over the eye. Harriet Williams Myers, president of the California Audubon Society, recalls, in a recent issue of *The Phainopepla,* an experience she had in Sequoia National Forest, where a large flock of the thrushes stayed close by her cabin during two weeks of snow. There were bare places under big nearby pines, she writes, and there the birds found shelter. Tiny cones that had fallen to the ground seemed to supply them with nourishment. Later, band-tailed pigeons and spotted towhees joined the thrushes and walked about the doorstep in a most friendly way. The birds could have sought lower altitudes, but evidently seemed happy where they were.

TWO SPECIAL SHRUB OFFERS!

Four nursery-grown Rhododendrons, 1 to 2 ft. high, each of different color, for $10, plus one Evergreen Lily of the Valley (Pieris floribunda) shrub *Free*. A combination of enduring beauty for your garden.

Twelve Rhododendrons and Azaleas, enough to cover 25 to 40 sq. ft., for $25. White to orange blooms from April to July — a wondrous series of blossoms. Ask for circular.

LABARS'
RHODODENDRON NURSERY
BOX M STROUDSBURG, PA.



IT'S LESS WORK WITH A Shower Pipe

Easiest and quickest way to water your lawn or garden. No need to waste summer evenings holding a hose. A Shower Pipe puts an end to this tedious work. Eight feet long (two 4 ft. sections) with four sprays. Sprinkles a 10 x 20 ft. area. Reaches every nook and corner. Does away with all hand-watering. A modern sprinkler for the busy man. No moving parts to wear out. Buy a Shower Pipe and you'll never have to buy another sprinkler. Thousands in use. Guaranteed. Low priced. Write for circular.

WHITE SHOWERS, INC.
6498 Dubois St. Detroit, Michigan
Irrigation equipment of all kinds

Burpee's Bulb Book free

Burpee's Bulbs Grow

Tells all about the best varieties of Tulips, Hyacinths, Daffodils, Lilies, Crocus, Iris, Peonies, etc., to be planted in the Fall. Many illustrations, planting information. Write today for your free Book.

W. ATLEE BURPEE CO.
519 Burpee Bldg. Philadelphia

FREE IRIS

Hamadan (rare pogo-cyclus hybrid) given with following $1 rainbow collection: Amber, Mrs. M. Cran, Yeoman, Le Grande Ferre, Olympus, Athene, Anne Bullen—priced last year at $5. Plant it now! Write for our illustrated catalog of prize-winning iris. We ship to every state. Our roots are better, our prices less. Situated in heart of horticultural district.

NATIONAL IRIS GARDENS
Bryan, Ohio Beaverton, Oregon

WATER LILIES

We supply everything for the Water Garden and Aquarium. Over 100 varieties of fish. Eighty shown in actual colors. Over 200 kinds of Aquatics. Special offer of Three Water Lilies, one red, one white and one blue sent for $3.00 postpaid in U. S. at proper planting time.

Request a free copy of our catalog. Address

BELDT'S AQUARIUM
2140 Crescent Ave., St. Louis, Mo.

TROPICAL & GOLD FISH

An Iris Bargain

35 selected unnamed Williamson seedlings, blooming size, (at least 15 of Dominion parentage) for $5.00. Specify "Lot B". And ask for our interesting Iris Catalog.

LONGFIELD IRIS FARM
409 Market Street, Bluffton, Indiana

IRIS

Rare, exclusive varieties giving you new garden beauty at small cost. Superior quality, healthy roots or rhizomes, easily grown in almost every state in the Union. Write for our free 1932 catalog. Many full color illustrations. New low prices.

Carl Salbach
640 Woodmont Avenue, Berkeley, Calif.

Australian Birds

The popularity of the latest book on Australian birds, *What Bird Is That?*, by Neville W. Cayley, may best be seen from the fact that the first edition of 3500 volumes sold out in two weeks. To the American with an interest in the birds of foreign countries, it is a mine of information, and a mine the ore in which does not have to be pried loose by weary reading, but may be gathered as rapidly as the eye can run over the pages. The grouping of the birds is particularly happy. Australia's largest birds, the forest-frequenting birds, the birds of the heath-lands and open country, of the lakes, streams and swamps, and of the ocean and shore are given separate divisions, and each bird's nest, eggs, distribution and principal habits are described in short, pithy paragraphs. Excellent four-color plates make word descriptions of the appearance of the birds unnecessary. A complete index and an appendix listing the birds introduced and established in Australia round out a work that is a solid contribution to ornithological literature. Mr. Cayley is vice-president of the Royal Zoological Society of New South Wales, and has wandered over nearly all of Australia gathering material for this volume. The book is published at 12 shillings sixpence by Angus and Robertson, Ltd., 89 Castlereagh Street, Sydney, Australia.

Attune With Spring

An original little volume, *Attune with Spring in Acadie,* has recently come from the pen of Claire Harris MacIntosh, a Nova Scotian who knows her woods, fields and her birds. It is in verse, and describes the notes and habits of our northern birds with a faithfulness and skill to be gained only by close observation and study. The theme of the story is unique; the birds, both residents and migrants, meet in a combined banquet and tournament where contests of beauty, acrobatic feats, flight, swimming, diving, swooping and song are held. In her skill in handling this theme Miss MacIntosh reveals both her wide knowledge of birds and her ability as a poet. Following the verse are five musical compositions in which the songs of well-known birds are represented. There are also lists of Acadian birds showing relative abundance, season of residence, time of appearance and favored habitats. The volume is illustrated by striking black and white drawings by Miss Marjorie H. Tozer. It is published at $2.50 by Thomas Allen, 266 King Street, West Toronto, Canada.

Celestial Offspring

Once again Julie Closson Kenly lends her charming pen to telling a Nature story for boys and girls, this time in *Children of a Star.* In this latest of her books she sketches in an attractive narrative the development of life processes, the title coming, of course, from the first outflinging of Earth from the flaming sun. This book is not exclusively for the younger folk, however, and many adults would benefit by reading it and getting a picture that has dimmed with time or which never was a part of their educational experience. The publishers are D. Appleton and Company and the price is $2.50.

This Sectional

LOG CABIN

$295. F.O.B. Thendara, N. Y.

- Sturdily constructed of genuine White Pine Log Siding. Many other models on exhibition at our large showroom. *Write for Booklet M-2.*

ADIRONDACK LOG CABIN CO.

Showroom: 448 Lexington Ave. New York City

The Charm of Enduring Beauty

Genuine RUSTIC HICKORY furniture is a lifetime investment—not a passing fad. Its quaint charm lends an irresistible harmony to summer home, lodge, lawn, or outdoor living room.

Genuine RUSTIC HICKORY furniture is made by expert craftsmen from the choicest Northern hickory. Among its 150 styles you will find pieces for every interior and outdoor need in plain, lacquered, colored and the new overstuffed patterns.

Ask about our new children's play houses with juvenile furniture to match.

Our big catalog showing many new styles and new, low 1932 Price List sent FREE upon request

Rustic Hickory Furniture Co.
1701 State St., La Porte, Ind.

WATER LILIES
RARE & CURIOUS FISH

3 Superb Lilies, Chromatella Yellow, Blue Beauty, Opal Pink. 8 Other Water Plants & 6 Snails for $5.00

30 BEAUTIFUL FANCY GOLDFISH $5.00 including Telescopes, Comets, Fantails, Nymphs, Calicoes, Fringetails—or 6 pairs of Assorted Tropical Fish, 5 Varieties.

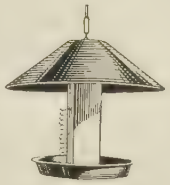
Write for Free Catalog

PUTNAM'S FISHERIES 501 N. Washington St., Buffalo, N. Y.

End "chemical plant" smells when you give your dog a bath. Miller's Dog Soap has a clean, sweet fragrance—it kills fleas—benefits your dog's scalp—brings out the natural gloss and sheen of his coat. Money refund guarantee. Ask your dealer or send $.25 today to Battle Creek Dog Food Co., 682 State St., Battle Creek, Mich.

● Big Cake 25c Postpaid **MILLER'S**

This bird cafeteria and shelter is sure to bring the songsters to your garden. Feeds automatically; keeps food and birds dry; avoids waste; long lasting; practical. Includes suet basket. 12" high, 14" diameter. Colors Green, Grey, Brown. $2 each, 3 for $5.50 postpaid. West of Mississippi add 20c.



F. BLAKE 1975 GRAND AVE., NEW YORK CITY

Packard Bird Houses

Best by Test! Ask the Bird that Owns One

6 for $5.—Special Spring Bargain

WHY PAY MORE? ORDER NOW!

EVERYTHING for Wild Birds. Catalogue Free

WINTHROP PACKARD

1433 Washington St., Canton, Mass.

Bird House $1

—designed by leading naturalist to attract songbirds. Scientifically built of rustic cedar—no imitation board used. $1.00 post paid. Regular price $1.45. Catalog of famous Lincraft Garden Furniture, sent free to every buyer. Send one dollar today on money back guarantee. New Jersey Fence Co., 112 Logan Avenue, Burlington, N. J.

Birds of all kinds to bring you happiness.

Healthy Birds raised on our Three Acre Breeding Farm. Send for price list. Live arrival guaranteed.

Costa Mesa Bird Farm, Box 141, Costa Mesa, California

3 Rustic Cedar Bird Houses for $5.00 Post Paid
Catalog on request
CRESCENT CO., Toms River, N. J.

BEAUTIFUL BIRDS

4 Pairs Assorted for $15.00

1 Pr. Green Parakeets.....$5.00
1 Pr. Yellow Parakeets..... 6.00
1 Pr. Zebra Finches..... 3.50
1 Pr. Java Rice Birds..... 5.00

ACTUAL VALUE $19.50
SPECIAL PRICE $15.00
for all 4 pairs shipped safely to you.
BEAUTIFUL CANARY SINGERS
Send P. O. Money Order with your order.
ILLUSTRATED CATALOG FREE TO BIRD LOVERS
BIRD HAVEN, R.F.D., 2306, Reseda, Cal.

WHITE COLLIE PUPS

the most beautiful specimens the Dog World can offer. Useful and intelligent. Catalogue.

COMRADE FARM KENNELS Galion, Ohio

Your Dog and Mine

One of the best friends man's best friend has ever had is Will Judy, editor of *Dog World*. He has written and published material on dogs nearly all his life, and has ever been their champion and enthusiast. His latest endeavor is a series of booklets packed with information acquired through years of experience and which deal with subjects dear to a dog-lover's heart. The titles of the pamphlets now available are: Feeding the Dog, Housebreaking the Dog, Laws about Dogs, Handling the Mating of Dogs, Whelping of Puppies, How to Ship Dogs, The Dog in the Show Ring, and Dog Shows and Rules. Other titles will be issued from time to time. Each booklet covers its subject in brief yet complete fashion, giving the fundamental rules and methods involved and bits of practical and workable advice. They are fifty cents each, or seven for two dollars, and are published by the Judy Publishing Company in Chicago.

New Bird Sanctuaries

The Federal Government is acquiring ten new bird sanctuaries, covering an area of 43,227 acres, and costing $248,000, following approval of the purchases by the Migratory Bird Conservation Commission. They will be located in nine states, New York, Maryland, North Carolina, South Carolina, Florida, North Dakota, Wyoming and Nevada. Chief of the acquisitions will be an area of 2,274 acres of land and water adjacent to Howlett, Long Island, on the Atlantic Coast flight route of migratory birds, and a 10,000 acre tract near Cambridge, Maryland, where large numbers of black duck and blue-winged teal breed each year. Including these prospective refuges, a total of 220,713 acres is established or in the process of being established as inviolate sanctuaries for the much-shot-at migrants.

Bird House Exhibition

The second annual bird house exposition, which was open to boys and girls of Milwaukee County, Wisconsin, and at which many striking designs were shown, was held in the rotunda of the Milwaukee Public Library in April. It was sponsored by the Milwaukee County Federation of Women's Clubs. Before the exposition, bird lovers in the country designed appropriate houses and broadcast specifications and plans to schools, thus insuring that contestants would know the proper requirements before building their models. Local women's clubs, teachers and parent-teacher groups cooperated to make the exhibit an outstanding success. The merit in such exhibitions as this needs no supporting arguments. Many counties, cities and states would find an immediate response should they follow the lead of Milwaukee County and stage similar conservation events. The exhibition was arranged under the direction of Mrs. Edward LaBudde, conservation chairman, and Mrs. Albert Toepfer, the chairman of the exposition.

CLASSIFIED

ANIMALS & BIRDS

BABY ALLIGATOR. Cutest pet. $1. Shuler Horne, Charleston, S. C.

BIRDS—100 varieties, finches, canaries, parakeets, doves, etc. Send for list. Hoffman's Aviaries, 169 Copley Avenue, Teaneck, N. J.

RABBITS, various breeds, $1.50 and up. WHITE MICE, $1.00 per trio, $3.00 dozen. BREEDING AND LABORATORY INSTITUTE, 567 Third Avenue, New York City.

HAVE a limited number of Fine Chinese Ringneck Pheasant eggs for sale—price reasonable. A. E. REPPERT Route 2, Flemington, W. Va.

FLYING SQUIRRELS—PETS supreme. Mated pair $5.00, two pairs $7.50, prepaid, safe delivery guaranteed. Booklet. Wildwoods Fur Farms, Woodville, Texas.

ARCHERY

RAW MATERIALS, FINISHED TACKLE. Highest quality. Reasonable prices. List free. HARRY HOBSON, Lyons, Oregon

BINOCULARS—FIELD GLASSES

BINOCULARS, Field Glasses, Telescopes slightly used, $1.75 up. 8x Prism Binoculars $11.00, all makes; DuMaurier, Busch, Lemaire, Colmont, Megaphos, etc., 3 to 24 power. World's largest assortment. Catalog free. **DuMaurier Importers, Dept. 86A, Elmira, N. Y.**

CAMERAS & PHOTO FINISHING

MOUNTED Colored Enlargements that are different. 5 x 7, 25 cents; 8 x 10, 50 cents. Send negative. Gibson Photo Co., 839 Gravesend Ave., Brooklyn, N. Y.

COCOONS

COCOONS of our giant silk spinning moths Cecropia, Cynthia, Polyphemus and Promethea assorted—5 for $1.00; 11 for $1.75; 16 for $2.25. Postage prepaid. Moths emerging now. A. Glanz (Naturalist), 740 New Lots Ave., Brooklyn, N. Y.

INDIAN RELICS—DEN CURIOS

PREHISTORIC STONE IMPLEMENTS, modern Indian beadwork and trappings, Navajo rugs, antique firearms, weapons, minerals, fossils. Illustrated lists 10c. N. E. CARTER, Box G-15, Elkhorn, Wis.

INDIAN Relics, coins, curios. Beadwork. Catalog free. Vernon Lemley, Northbranch, Kan.

STEER HORNS

MOUNTED STEER HORNS, seven feet spread. Rare decoration. For sale by
LEE BERTILLION MINEOLA, TEXAS

OUR POPULAR TOY BREEDS

Boston, Wire-haired and Scottish Terriers—Pekingese—Pomeranians. Also all other breeds and varieties of dogs. Our dogs are known all over the country.

Write or call for information
LONDON PET SHOP, 300 Fifth Ave., N. Y. C.

Little Jenny Wren will love this beautiful

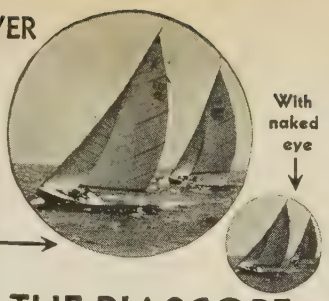
Wren House

Just the place to raise her family. You'll spend many happy hours listening to this jolly, saucy little songster, who destroys thousands of insects daily. Scientifically built. Weather-proof. All brass fastened. Attractively colored in Leaf Green or Dark Brown. Last for years. Send for it today. $1 Postpaid. Blue Bird House, $1.50. Feed Station, $3; The Set $5.

$1 Postpaid

GARDEN COMPANY, Box 56, Stratford, N. J.

6 POWER
$5.00



TRY THE BIASCOPE

PROBABLY biggest money's worth in binoculars anywhere. Cuts distance to one-sixth. Large clear view. Instant one-finger focusing. Fits coat pocket. Genuine leather case. Colors: Green, mahogany, oak, black, mottled orange-black or red-black. At dealers or direct, $5. Money-back guarantee.

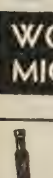
POCKESCOPE, $1 and $2
(Pocket Telescope)

HALF A BIASCOPE, to use with one eye. Same fine optical system. Leather case. 3-power $1.00. 6-power $2.00.

Send for free catalog of Microscopes, Field Glasses and Telescopes.

WOLLENSAK OPTICAL CO.
762 Hudson Ave. Rochester, N. Y.

WOLLENSAK BINOCULARS MICROSCOPES » TELESCOPES



Reveal the World Invisible
LOMARA ULTRA-LOMARA
POCKET MICROSCOPES
Fountain Pen Size
Magnifications: 15 to 1410X

Small, compact and precise, these microscopes are scientific instruments with an excellent optical system—suited for research work in the home, in the laboratory and afield.

Prices $4.75 and up.
Send for booklet N 6
C. P. Goerz American Optical Company
317 East 34th Street New York

For the Young Naturalist!

Practical, Inexpensive Equipment for Collectors

"NATURECRAFT" Collecting Kits were designed specially for amateur Naturalists who enjoy collecting, preserving and exhibiting Moths, Butterflies and other insects. Kits contain scientific equipment of high quality which, if bought separately, would cost much more.

Fine Gifts for Boys, Girls, Campers!

Kit "C": (shown above) contains strong net, spreading board, exhibit mount, specimen butterfly, jars, pins, labels and instruction book. Complete $5.00

Kit "E": larger, comes in compartment carrying case with handle. Contains sectional net, spreading board, two exhibit mounts, specimen butterfly, trowel, jars, pins, labels and instruction book. Complete . . $10.00

Ask for "NATURECRAFT" Collecting Kits in Toy and Sporting Goods Departments; or we will send your Kit prepaid upon receipt of price.

Send 10c for this Interesting Book

Tells "How to Collect, Preserve and Mount Butterflies and Insects." Get one now and start right away.

Descriptive Circular Sent Free on Request

Standard Scientific Supply Corporation
14 West 25th Street New York, N. Y.

25¢ FOR PINS—RINGS $1.25

Class pins—any letters, any year, any colors. Silver plated, 1 to 11, 25c ea.; 12 or more, 20c. Gold plate, 30c; sterling 35c. You can't beat these guaranteed values. Class rings, jewelled pins, medals, etc.

METAL ARTS CO., INC., Factory 25 Rochester, N. Y.

RING CATALOG FREE

Florida Plant Life

When Charles Torrey Simpson writes of Florida Nature, the reader is assured of three things: there will be no inaccuracies, the subject will receive full justice both in color and completeness of treatment, and those who have contributed to wild life destruction will get a verbal drubbing. This interesting student of the wild life of the Everglade State has been tramping over the hammocks and meandering through the waterways of his favorite paradise for most of the present century, and it is a well-hidden corner that he has not discovered. *Florida Wild Life,* fresh from the Macmillan presses, meets all expectations. It is concerned mainly with the rich and variegated flora of our only sub-tropic state, but contains excellent chapters on seashells, Florida fishes, and the effects, from a scientist's viewpoint, of the great hurricane of 1926. Floridians will not exactly cheer the writer for his pages on the climate, but will forgive everything because of his glowing description of what he aptly calls "the pageant of the seasons." Throughout the book peep glimpses of the author himself, his likes and dislikes (the latter largely what he describes as "closet naturalists"), some of his many adventures. As he is as interesting as much of the land of which he writes, the volume is thereby enriched. You can't help being fascinated by *Florida Wild Life.* It is an able and extremely readable work on a beautiful and exotic land. Macmillan prices the volume at $2.50.

Washington Butterflies

Butterfly lovers who are planning to visit the Capital City during the Bi-Centennial year will wish first to read Austin H. Clark's interesting and exhaustive monograph, *The Butterflies of the District of Columbia and Vicinity.* Dr. Clark, Curator of Echinoderms at the United States National Museum, has spent most of his leisure during his quarter century in Washington collecting and studying the several hundred butterfly species that are found in the parks, the bogs and the fields scattered about the city. He has found the region particularly fascinating, as it is the meeting place for northern and southern, mountain and coastal plain species, and has filled the volume with his many experiences and discoveries. Excellent plates made from photographs accompany the work, increasing its value immensely, especially to amateurs. The book is published as Smithsonian Institution Bulletin 157, and is obtainable from the Superintendent of Documents, Washington, D. C., for $1.50.

HANGING WREN HOUSE

Made of No. 1 Clear Red Cedar Body painted white. Roof either red or green. $1.00—Six for $5.00. Unpainted—75c—Six for $4. Postpaid in U. S. A.

Kendal Reay & Co. Waterford, Mich.

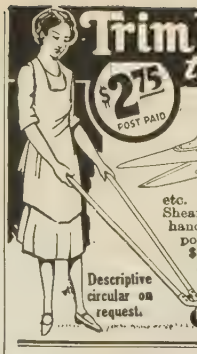
Nature Books

How to Study and Collect Insects, 50 cents.
N. A. Tree Check List, 50 cents.
2 for 75 cents.
Please do not send stamps.

ARCHIE J. WILLIAMS, *Naturalist*
622 Sandford St., Covington, Kentucky

Trim Your Lawn this easy way

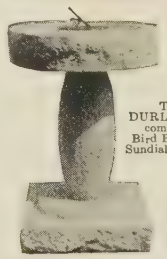
$2.75 POST PAID



Without stooping, you just walk along and neatly trim the places not reached by the mower with this new, long-handled trimmer; sidewalks, flower beds, walls, etc. Your lawn is always neat, clean. Shears of steel, self-sharpening; long 4 ft. handles of finished hardwood. Shipped postpaid in U. S. $2.75 (outside U. S. $3.00). Order now—money back guarantee.

Descriptive circular on request.

KLEIN MFG. CO., Box B, Burlington, Iowa



The DURLSTONE combined Bird Bath and Sundial Pedestal

Purbeck-Dorset
IMPORTED
Garden Ornaments
Hand Hewn from Native Stone
Prices from $10.00
Illustrations upon Request

The Rowedders
697 Manor Rd.
West New Brighton
Staten Island, New York

BOWLETTE *patented*

BOWLETTE

Fascinating couple—Mr. & Mrs. Guppyi Fish. There is no birth control in this undersea garden. Twin or triplet baby Guppyis are born before your eyes every six weeks in Bowlette aquarium. They don't lay eggs!! Bowlette contains fish, landscape, food, complete instructions—$2.85 each—2 for $5.00 safely delivered to your home.

Dept. NM6 EASTERN GARDEN
Aquarists who made thousands of American fish fanciers
119 W. 21st Street, New York

EUROPE 29 DAYS ALL EXPENSES $195

ENGLAND HOLLAND BELGIUM FRANCE CANADA

Weekly sailings via Canadian Pacific, June 3 to August 19. Ask for details; also our free book of 200 House Party and Collegiate Tours.

THE TRAVEL GUILD, INC.
180 N. Michigan CHICAGO
521 Fifth Ave. NEW YORK
308 Boylston St. BOSTON

MARANACOOK
Camp for Boys 7-17
READFIELD, ME.

23rd year. Mature counselors. Cabins. Elective daily program. Riding. Sailing. Mountain, canoe and ocean trips. All sports.

WM. H. MORGAN, Director
566 White St., Springfield, Mass.

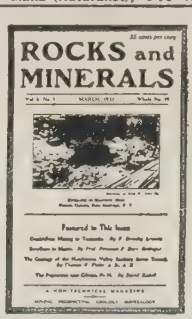
25 Tropical butterflies—Morphos, Leaf butterfly, Papilios, Urania Riphaeus, etc., all for $5.00.

Low prices on Riker Mounts.

4x5	at 30c	$ 3.00 per doz.
5x6	at 35c	$ 3.60 per doz.
6½x8½	at 45c	$ 4.50 per doz.
8x12	at 60c	$ 6.00 per doz.
12x16	at $1.25	$12.00 per doz.

Insect pins 35c per hundred No. 000 to 7. Adjustable spreading board, large, $1 each. Cyanide bottle No. 1 for small and medium butterflies 65c, No. 2 for large butterflies and moths 85c. Butterfly nets $1.25 each. **Postage prepaid.** 6½x8½ Riker Mt. & blue Morpho $1.25

A. Glanz (Naturalist), 740 New Lots Ave., Brooklyn, N. Y.



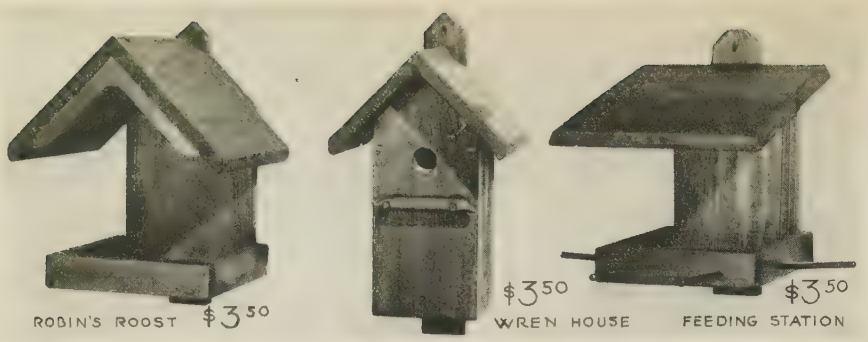
ROCKS and MINERALS

A 52-page, illustrated, untechnical magazine on mining, prospecting, geology, mineralogy. Issued quarterly.

Subscription $1.00 a year; foreign, $1.25.
Sample copy 35c

A subscription makes one a member of the Rocks and Minerals Association.

Rocks and Minerals, Dept. N
Peekskill, N. Y.
Enclosed find $..... for
☐ Subscription to Rocks and Minerals
☐ Sample copy
Name .....
Address .....



BIRD HOUSES

TOYS AND NOVELTIES—by Ex-Service Men

While the war has been over these many years for most of us, the men who were wounded and made unavailable for their usual occupations have had to adapt themselves to new work and ideas. This rehabilitation, however, has developed some of the finest artisans our country has ever produced, and it is with a great deal of pride that we offer herewith a few samples of their handicraft.

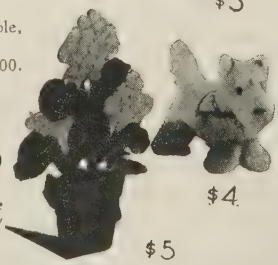
BIRD HOUSES and FEED SHELTERS—pure red cypress, inch thick, brass screws and hinges, scientifically constructed and approved by leading authorities—permanently rot-and-rust proof—from $3.00 up.

LAMBS' WOOL CATS and DOGS—alluringly soft, smart and lovable, $1.50 up.

DOOR JAMBS—Flower pot design, strong, attractive, decorative, $5.00.

Literature showing other novelties, bridge prizes, etc., gladly sent on request. Full value guaranteed on every item we sell.

$3


$4

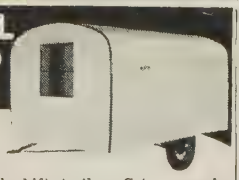
$5

DUGOUT CRAFTS

235 W. 52nd St.,
New York, N. Y.

A club where ex-service men may find work to pay their own way.

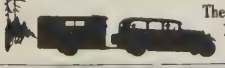
NEW MODEL COVERED WAGON



Don't put up with a makeshift trailer. Get a *genuine* Covered Wagon, now at a *new low price*. Full size, 9' x 6' with Pullman type beds, wardrobe closet, pantry closet, folding table, locker cupboards, kitchen work bench, 5 gallon water tank, wire wheels, pneumatic tires, screens, curtains and safe, patented spring draw-box. Built for years of service. Does away with bother of tents and canvas extensions.

WRITE TODAY FOR CATALOG

Get full information about this comfortable home on wheels! Ideal for tours, hunting and fishing trips; or use as summer cottage. Easily handled by any car. Write today.



The Covered Wagon Co.
14630 E. Jefferson
Detroit, Mich.

FREE FOLDER

The Perfect Graduation Gift

WEBSTER'S COLLEGIATE

New Fourth Edition

The best abridged dictionary. 106,000 entries, hundreds of new words, 1,268 pages, 1,700 illustrations. Thin-Paper Edition: Cloth, $5.00; Fabrikoid, $6.00; Leather, $7.50. At your bookseller's or from the publishers. Free specimen pages on request.

G. & C. MERRIAM CO., 153 Broadway, Springfield, Mass.

Get the Best

Give your Roses a Chance

Roses, and other flowers, can not thrive when infested with Aphis or Plant Lice. Keep them flourishing and healthy by spraying with

ROSE NICOTINE
—TRADE MARK—

100% Effective

Get a bottle of "Rose Nicotine" from the nearest drug store. It has been the standard flower spray for a quarter of a century. Vitrol sprays will NOT kill Rose Aphis—you MUST use Nicotine.

Three Sizes
40c-75c-$2.00

Write for free booklet on care of roses.

C.E.JAMIESON & CO · DETROIT

BIRD-LORE MAGAZINE

Tells all about Birds

Edited by Frank M. Chapman, curator Dept. Ornithology, Am. Museum Nat. History. How to study birds, build nesting boxes, feed-stands, baths. Color plate each issue. Sample copy, 10 cts. stamps. Circular free.

Bird-Lore Magazine
Box 687-6 Harrisburg, Pa.

$1.50 a year (6 issues)

WILD FLOWERS

OF THE

ALLEGHANIES

Their Character, Habits, Flowering Season, and Location; A Concise Definition of Colors, References to Medicinal Properties, Numerous Flower Legends, Historical References and a Fully Illustrated Key to the Families Represented. A Check List of Ferns Occurring in the Area is Appended.

BY JOSEPH E. HARNED

Eight Colored Plates from Paintings by Miss Mary Eaton and Mr. F. S. Mathews

700 Pages

With over 400 Illustrations from Line Drawings of Individual Species, Leaf Forms, Floral Characters and Types of Inflorescence, by Mr. F. S. Mathews, the noted Botanical Artist.

PUBLISHED BY THE AUTHOR
OAKLAND, MARYLAND

Price $4.50

Strange Cell Mates

A banana spider that lives in amity with a five-foot pine snake, two hog-nosed snakes, and now and then with a number of garter and water snakes is a prominent inhabitant of the Lehigh University vivarium, according to J. Wendell Burger of the Department of Biology. The spider has lived for more than a year in the cage with the snakes, and has had only one meal since its imprisonment. It does not seem to mind the lack of food, and apparently is in good health. Although the pine snake at least is capable of eating the spider, nothing has disturbed the peaceful relations of the arthropod and the reptiles. The big spider scampers across his companions' backs without ever disturbing them. The one repast he had consisted of the blood of a small bat which was placed in the den by a student for the snakes. They did not touch it, but the spider severely lacerated its head and drained the blood.

A Case of Ejectment

What are property rights to bees, wrens and robins? J. A. Schlintz of Excelsior, Minnesota is convinced that they mean nothing at all, after the series of episodes he recently witnessed. For a number of years a pair of wrens returned to a nest he had set up, but last spring, a pair of robins came north ahead of them, and built a home on top of the wren house. When the male wren arrived, and tried to enter his summer cottage, the robins promptly ejected him, and finally he was forced to resort to another house on the garage. Both robins and wrens raised their young successfully, and once the redbreast fledglings were able to fly, the robins moved out. All the wrens disappeared but the father. He seemed much interested in the old nest, and spent much time near it, but did not seem to dare to enter. Mr. Schlintz investigated, and discovered that a rather irascible bumble bee had taken up quarters somewhere around the wren house, though just where, no one knew. Mr. Schlintz tried moth crystal inside the house, but although he used enough to route an army of bees, old Bombus still gave his warning when the wren house was shaken. Finally the robins' nest on top was examined, and there, almost buried from sight in a mouse-like nest of dried grass, was the intruder. A little moth crystal fixed him; but even though the enemy was removed, the wren would not come back to the old nest. Mr. Schlintz is hoping that he will be back this year, now that the fumes from the bee-evictor have entirely disappeared.

The Supai Forecast

Last fall, the Supai Indians who live near the Grand Canyon predicted that it was going to be a hard winter, and when asked for their reasons, pointed to the heavy crop of pinyon nuts. Whether their logic was sound or not, their conclusion was correct. During November and December snow fell on sixteen days, and piled up a total of 42.75 inches compared with 16 inches for the same period in 1928, zero inches for 1929, and 5.75 inches for 1930. On December 13, the thermometer dropped to five below zero, thirteen degrees lower than at any time the winter before. On eight days it has been below ten degrees. The Indians were right.

The New York State College of Forestry

SYRACUSE UNIVERSITY

Syracuse, N. Y.

Undergraduate courses of four years are offered in forestry with the degree of Bachelor of Science. There is also opportunity for graduate work in several branches of forestry leading to advanced degrees.

The College owns and controls approximately 6700 acres of Experimental Forest Lands in various sections of the State. These forest lands, together with the Roosevelt Wild Life Experiment Station at the College, offer excellent opportunities for practical work in forestry.

Facilities for instruction in pulp and paper making, in kiln-drying and timber treating, and a portable sawmill, are features of the completely equipped plant.

Catalog will be sent upon request.

HUGH P. BAKER, Dean

Learn to be a—

LANDSCAPE ARCHITECT

At Home—By Mail

Big fees; pleasant, healthful work; a dignified, uncrowded profession offering remarkable opportunities. Immediate income possible, many students more than pay for course from fees earned while studying. Graduates are earning $50 to $200 a week. The first step toward success is to write today for details.

AMERICAN LANDSCAPE SCHOOL

Member National Home Study Council

6 Plymouth Bldg., Des Moines, Ia.

WESTERN TRAILS

DIRECTOR OF FIELD TRIPS
NATURE MAGAZINE

Please give me information about your endorsed trips to (Check choice)

UTAH PARKS ☐ YOSEMITE ☐

and trips to

YELLOWSTONE ☐ JASPER ☐

MT. RAINIER ☐ LAKE LOUISE ☐

INDEX TO ADVERTISERS

AQUARIUM

Beldt's Aquarium 377

BINOCULARS

DuMaurier Co. iii
Goerz, C. P. 379
Loring, J. A. iii
Wollensak Optical Co. 379

BIRD HOUSES

Blake, F. 378
Crescent Co. 378
Garden Co. 378
Kendal Reay & Co. 379
New Jersey Fence Co. 378
Packard, Winthrop 378

BOOKS

Bird-Lore Magazine 380
Merriam Co., G. & C. 380
Wild Flowers of Alleghanies 380
Williams, A. J. 379
Wise & Co., Wm. H. i

CAMPS

Maranacook Camp 379

EDUCATIONAL

Allegany School of Natural History . . . 381
American Landscape School 381
Newspaper Institute 334
New York State College of Forestry . . . 381
Pennsylvania State College 381

GARDEN & ACCESSORIES

Atkins & Durbrow 373
Burpee, W. Atlee Co. 377
Eastern Garden 379
Elliott Nursery Co. 373
Gibbs & Son, W. A. 375
Hudelson, H. M. 375
Johnson Water Gardens 375
Klein Mfg. Co. 379
LaBars' Rhododendron Nursery . . . 377
Longfield Iris Farm 377
National Iris Gardens 377
North Shore Ferneries 375
Otwell Iris Fields 373
Putnam's Fisheries 377
Rowedders, The 379
Rustic Hickory Furniture 377
Salbach, Carl 377
Tobacco By-Products 375
Wayside Gardens 375
White Showers, Inc. 377
Wild Flower Preservation Society . . . 373

GIFTS

Metal Arts Co. 379

HOTELS

Admiral Hotel . . . . . Third Cover
Chalfonte-Haddon Hall . . . . Second Cover
Harrison Hotel 334
Morrison Hotel . . . . . Second Cover
Piccadilly Hotel . . . . . Second Cover
Seymour Hotel . . . . . Second Cover

MISCELLANEOUS

Comfitape Laboratory 334
Covered Wagon 380
Glanz, A. 379
Jamieson, C. E. 380
Rocks & Minerals 379
Standard Scientific Service 379
Dugout Crafts 380

PETS AND THEIR CARE

Battle Creek Dog Food Co. 378
Bird Haven 378
Comrade Farm Kennels 378
Costa Mesa Bird Farm 378
London Pet Shop 378

PHOTOGRAPHIC

Brooks, Burleigh iii
Willoughby Camera Co. iii

SPORTING GOODS

Adirondack Log Cabins 377
Bean, L. L. 381
Old Town Canoes 381

TRAVEL

Clarke Steamship Co., Ltd. iv
Colorado Association, The iv
East Michigan Tourist Association Second Cover
Southern Pacific R. R. 335
Travel Guild, Inc. 379
Union Pacific R. R. 333

STUDY NATURE

"Nature is the only book that teems with meaning on every page"—Goethe

NATURE CAMPS—conducted by Penn. State Summer Session—for teachers and naturalists. Picturesquely located in mountains of Central Pennsylvania, where birds and wild animals abound. Study their habits and haunts. Learn, too, the characteristics of rare plants and trees.

First camp—June 29 to July 20

Second camp—July 19 to August 9

Lectures by eminent naturalists

A vacation of fruitful, fascinating study that will bring you into a more intimate knowledge of nature and its myriad wonders.

Illustrated booklet on request

PROFESSOR GEORGE R. GREEN
Director of Nature Camps

THE PENNSYLVANIA STATE COLLEGE
State College, Pa.

OLD TOWN CANOES are perfectly balanced . . . easy to handle . . . light . . . fast . . . strong. Honest Indian models are made of tough cedar, covered with leak-proof canvas. They wear for years!

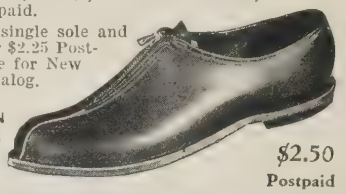
It's easy to own an Old Town. 1932 prices lowered to $63. Write for free catalog showing many models. Also outboard boats, dinghies, and rowboats. Old Town Canoe Co., 386 Main St., Old Town, Maine.

"Old Town Canoes"

BEAN'S CANOE SLIPPER

Made of high grade tan elk leather with double oil tanned moccasin sole and rubber heel. Off and on in a second with Talon Fastener. It is a combination "Slipper Shoe" that can be used for many purposes around camp and cottage. Sizes 3 to 12. Prices, Men's and Ladies', $2.50 Postpaid.

Also with single sole and no heel for $2.25 Postpaid. Write for New Spring Catalog.



Mfd. by
L. L. BEAN
84 Main St.
Freeport
Maine

$2.50
Postpaid

Teachers of Nature Study, Ornithology, Biology, Physical Geography, or General Science

may observe, collect, and study plants, animals, rocks, under experienced leadership and with the best facilities for field, laboratory, and library work while living comfortably in an invigorating climate with congenial associates.

JULY 5 TO AUGUST 24, 1932

The Allegany School of Natural History

The Summer School in the Forest

Quaker Bridge, New York

Sixth season of a new type of school, based on the best educational principles and offering college credit.

For booklet write

DR. R. E. COKER, Chapel Hill, N. C.

BRANCH LIBRARY
No. 23
C. P. L.

INDEX TO NATURE MAGAZINE

VOLUME XIX

January-June, 1932

ASTRONOMY

Celestial bodies, speed, 252.
Constellations, 119, 120, 121.
Counterglow, 180.
Earth, 251, 252.
Earth, The (rev.), 4.
Evening skies: January, 56-58; February, 119-121; March, 180-181; April, 251-253; May, 320, 323; June, 370-372.
Gegenschein, 180.
Mercury, 180, 181.
Planets, speed, 251, 252.
Solar eclipse (total), 56, 57.
Star counts, 370, 371.
Stars and Planets (rev.), 4.
Zodiacal light, 180.

BIRDS

Aquila chrysaetos (illus.), 34.
Argus bipunctatus, 50.
Argusianus bipunctatus, 50.
Auk, great, 26.
  razor-billed, 267.
Auklet, Cassin's, 151, 152.
  rhinoceros, 151, 152 (illus.).
Bird carving (gen., illus.), 37-38.
Bird migration, help (gen., illus.), 110.
Bird studies, aerial, 266, 267.
Birds and flowers, rare (gen., illus.), 49-52.
Birds, Colorado (gen., illus.), 284-288, 321, 322.
  digging for (gen., illus.), 147-153.
  State (gen., illus.), 229-236.
  usefulness on farm (rev.), 136-137.
Blackbird, 322.
  Brewer's, 137, 288.
  red-winged, 288.
  yellow-headed, 288.
Bluebird, 90, 235.
  chestnut-backed, 322.
  mountain, 231, 234, 235, 321.
Bobwhite, 234, 235.
Brown thrasher, 234.
Bunting, lark, 231, 233 (illus.), 234.
  284 (illus.), 286.
  lazuli, 286.
  painted (illus.), 234.
  Townsend's, 49, 50 (illus.).
Bush-tit, 321.
Buteo lineatus lineatus, 162.
Buzzard, 234.
  turkey, 93.
Calamospiza melanocorys (illus.), 233.
Camp robber, 288 (illus.), 322.
Canary, wild, 233.
Cardinal, 229 (illus.), 234.
Catbird, 93, 234, 235.
Catharista urubu (illus.), 35.
Cathartes aura septentrionalis (illus.), 34.
Cedar waxwing, 124.
Chickadee, 18, 97, 234, 235, 322.
  black-capped, 233, 250 (gen., illus.).
  Carolina (illus.), 233.
Condor, California (illus.), 34.
Cormorant, 148, 152.
Corvus brachyrhynchos (illus.), 36.
  corax sinuatus (illus.), 33.
Creeper, 165.
Crossbill, 322.
Crow, 18, 36 (illus.), 83, 353.
Cryptoglaux funerea richardsoni (illus.), 33.
Cuckoo, 18, 19, 137.
Dipper, American, 322.
Dove, Carolina, 235.
  mourning, 288.
Duck, baldpate, 360.
  black, 360.
  canvasback, 254, 360.
  eider, 267.
  gadwall, 360.
  lesser scaup, 254.
  mallard, 52, 360 (illus.).
  redhead, 360, 254.
  scaup, 360.
  scoter, 105.
  shoveler, 360.
  wood, 360.
Eagle, 83.
  American (illus.), 236.
  bald, 19, 20 (illus.), 35 (illus.), 83, 148, 152, 236 (illus.).
  golden, 34 (illus.), 288.
Eider duck, 267.
Emu (gen., illus.), 350.
Eoa, 49.
Falco columbarius (illus), 33.
  mexicanus (illus.), 36.
  rusticolus gyrfalco (illus.), 35.
Falcon, Peale's, 152.
  prairie, 36 (illus.), 288.
Finch, brown-capped rosy, 322.
  Cassin's purple, 322.
  house, 321.
  purple, 235.
  rosy, 322.
Flicker, 87-91 (gen., illus.), 165, 231, 235.
Flycatcher, 322.
  Acadian, 93.
  great-crested, 93.
  small-headed, 49.
Gnatcatcher, western, 321.
Golden robin, 352.
Goldfinch, 233 (illus.), 235.
  American, 75.
Goose, brant, 360.
  Canada, 360.
Goshawk, 136.
Grosbeak, Rocky Mountain pine, 322.
  rose-breasted (illus.), 234.
  western blue, 286.
Grouse, 298.
  blue, 328, 366 (gen., illus.).
  dusky, 321.
  ruffed, 235.
Guillemot, black, 267.
  pigeon, 148.
Gull, 79, 105-108 (gen., illus.), 147 (illus.), 148 (illus.), 151 (illus.), 178.
  black-backed, 105 (illus.), 107.
  Bonaparte's, 83, 105, 106 (illus.), 107, 108.
  Franklin's, 108.
  glaucous, 106, 107, 108 (illus.).
  great black-backed, 108.
  herring, 105, 106, 107 (illus.), 108, 267.
  Iceland, 106, 107, 108 (illus.).
  ivory, 106, 108 (illus.).
  Kumlien's, 107, 108 (illus.).
  laughing, 106 (illus.), 107, 108.
  little, 108.
  ring-billed, 105, 106, 107 (illus.).
  Sabine's, 106 (illus.), 108.
  sea, 214, 235.
Gymnogyps californianus (illus.), 34.
Gyrfalcon (illus.), 35.
Haliaeetus leucocephalus (illus.), 35.
Hammerhead stork (gen., illus.), 29-32, 66.
Hawk, 29, 60, 322.
Hawk, Cooper's, 136.
  duck, 136, 202.
  ferruginous rough-legged, 286.
  pigeon (illus.), 33.
  red-shouldered, 93, 162-166 (gen., illus.).
  sharp-shinned, 136.
Heath hen, 265.
Heleodytes brunneicapillus couesi (illus.), 232.
Hummingbird, 234.
  broad-tailed, 286 (illus.), 322.
Hylocichla fuscescens fusescens (illus.), 232.
Jacksnipe, 192, 193.
Jay, 18.
  eastern blue, 288.
  long-crested, 231, 322.
  pinyon, 321.
  Rocky Mountain, 288 (illus.), 322.
  Woodhouse, 321.
Killdeer, 193.
Kingbird, Arkansas, 286.
Kinglet, 49.
  ruby-crowned, 231 (illus.), 322, 328.
Kittiwake, 106, 107 (illus.).
Kookaburras, 139.
Lark, desert horned, 286.
Larus argentatus, 106.
  atricilla, 107.
  delawarensis, 106.
  hyperboreus, 107.
  kumlieni, 107.
  leucopterus, 107.
  marinus, 108.
  minutus, 108.
  philadelphia, 108.
  pipixcan, 108.
Leucosticte, 322.
Magpie, 286.
Martin, purple, 234.
Meadowlark, 234, 235.
  western, 231, 234, 235, 321.
Micropallas whitneyi (illus.), 36.
Mockingbird, 231, 234, 235.
  western, 235, 286, 321.
Murre, 148 (illus.), 149 (illus.), 150 (illus.), 151 (illus.), 152.
  California, 149.
  common, 267.
Murrelet, marbled, 152.
Muscicapa minuta, 49.
Night heron (illus.), 59.
Nonpareil (illus.), 234.
Nutcracker, Clark's, 322.
Nuthatch, 165.
  pygmy, 322.
Oriole, Baltimore, 235, 352-354 (gen., illus.).
Osprey, 6 (flight), 235.
Owl, 29, 322.
  barn (illus.), 32.
  barred, 93.
  burrowing, 18, 286.
  elf (illus.), 36.
  Florida barred, 94.
  great horned, 136.
  horned, 338 (illus.), 339-342 (gen., illus.).
  long-eared, 286.
  Richardson's (illus.), 33.
  Rocky Mountain screech, 286.
  western horned, 286.
Oyster catcher, 149 (illus.), 212.
Pagophila alba, 106.
Partridge, 189.
Peafowl, raising, 189.
Pelican, 234, 349-350 (gen., illus.).
Penthestes carolinensis (illus.), 233.
Petrel, Beal's, 149.
  stormy, 26.
Pheasant, Argus, 50.
  ring-necked, 288.
Phoebe, 288.
Pigeons, 202.
Pipit, American, 322.
Plover, field, 248.
  mountain, 286, 315 (illus.).
  prairie, 248.
  turkey, 248.
  upland (gen., illus.), 248.
Ptarmigan, 280, 298.
  white-tailed, 287 (illus.), 322.
Puffin, Atlantic, 267.
  tufted, 147 (illus.), 148, 149 (illus.), 152 (illus.).
Quail, valley, 231.
  scaled, 321.
Rails, 60.
Raven, 6 (flight), 33 (illus.), 83.
  American, 33.
  northwest, 33.
  white-necked, 33.
Regulus cuvieri, 49.
Riddle of Migration (rev.), 127, 128.
Rissa tridactyla, 106.
Road-runner, 235, 321.
Robin, 231, 232 (illus.), 234, 235, 264.
Sage hen, 322.
Sapsucker, red-naped, 284 (illus.), 322.
  Williamson's, 322.
Scopus bannermani (illus.), 31.
Scoter, 105.
Shrike, Drongo, 29.
  white-rumped, 285 (illus.), 286.
Snipe, Wilson, 193.
Solitaire, Townsend's, 322.
Sparrow, 288, 322.
  chipping, 243.
  Lincoln's, 322.
  mountain song, 288.
  sage, 322.
  song, 234, 235.
  white-crowned, 243 (gen., illus.), 322.
Spinus tristis tristis (illus.), 233.
Starling, 139.
State birds (gen., illus.), 229-236.
Swallow, 18 (illus.), 110 (migrating), 288, 322, 353.
  tree, 235.
  violet-green, 285 (illus.), 322.
Swift, white-throated, 282, 322.
Sylvia montana, 49, 51 (illus.).
Tanager, western, 234.
Tern, black, 193.
  common, 267.
Thrasher, sage, 322.
Thrush, 322.
  Audubon's hermit, 288 (illus.), 322.
  hermit, 235.
  wood, 288.
Titmouse, 321.
Towhee, canyon, 321.
Turdus migratorius (illus.), 232.
Turkey, wild, 290, 321.
Veery (illus.), 232.
Vireo, Bell's, 286.
  plumbeous, 322.
Vulture, 234.
  black (illus.), 35.
  turkey (illus.), 34.
Warbler, 18, 322.
  Audubon's, 322.
  Aurora, 49.
  Bachman, 50.
  Blue mountain (illus.), 51.
  Nashville, 52.
  parula, 93.
  pileolated, 322.
  prothonotary, 93.
Water ousel, 25 (gen., illus.), 322.
Water-thrush, northern, 52.
Weaver bird, nest (illus.), 32.
Woodcock, 60 (conservation), 193.
Woodpecker, 137, 322, 353.
  alpine three-toed, 322.
  golden-winged, 87.
  Lewis, 321.
  pileated, 93.
  red-bellied, 93.
  red-headed, 19, 88, 165, 234.
Wren, 234, 322.
  cactus, 231, 232 (illus.).
  canyon, 322.
  Carolina, 93, 235.
  house, 138 (nest, illus.), 235.
  winter, 79, 83.
Xema sabini, 108.
Yellow hammer, 231.
Yellow-legs, lesser (illus.), 84.
Yellowthroat, western, 288.

CONSERVATION

Balance of Nature (editorial), 77.
Conservation, 18-20.
  California flora, 258.
  Department of the Interior, 137.
  education, 6.
  forest, 205, 373.
  game, 122.
  waterfowl, 60, 122, 182, 188, 254.
  wild flowers, 190, 259, 260.
  wild life, 141, 192, 193, 260 (Iowa).
Migratory Bird Board, 182, 254.
Traps, steel, 189, 254 (law).

FISHES

Balloon fish, 117.
Bass, 282.
  rock, 174.
Candlefish, 26.
Cannibal fish, 351.
Catfish, 282.
Crappie, 282.
Fish, aquarium (feeding), 203.
Forcipiger longirostris, 117.
Gar, short-nosed, 94.
Hippocampus punctulatus, 143, 144, 145, 146, 186, 187.
Jackfish, 94.
Moray, 117.
Mudfish, 93, 94.
Parrot fish, 117.
Perai (skull, illus.), 351.
Perch, 282.
Salmon, 78 (illus.), 79, 80, 82, 83, 84, 86.
Seahorse, 142 (illus.), 143-146 (gen., illus.), 186, 187.
Shark, kelp, 174.
Stickleback (illus.), 351.
Surgeon-fish, 117.
Trigger-fish, 144.
Trout, 280, 282, 292 (illus.).
Unicorn fish, 117.

FORESTRY

American Tree Association, 54, 62, 98, 99, 175.
George Washington Memorial Trees, 98, 99, 175-177 (gen., illus.), 217-219, 373.
Tree-planting, 362.
Washington Bicentennial, 373.
  trees (gen., illus.), 54-55.
  Commission, 98.

INSECTS AND OTHER INVERTEBRATES

Ammophila, 158, 159.
Andrenidae, 158.
Angleworm, 28.
Ant, 28, 89, 95, 157, 265.
  hairy sand, 157 (illus.), 159, 160.
Ant-lion (gen., illus.), 355.
Aphis-lion, 74, 96.
Arthropods, 157.
Barnacles, 216.
Bee, 95, 112, 153, 157, 158, 160, 161.
Bee, honey, 158 (illus.), 159, 161.
Beetle, 26, 27.
  whirligig, 93.
Bombex, 159.
Bombus, 159, 161.
  affinis (illus.), 158.
Bumble-bee, 157, 158 (illus.), 159, 161 (sting, illus.).
Butterfly, 124, 351.
  tiger swallow-tail (gen., illus.), 99.
Carpenter-bee, 161.
Caterpillar, 159, 160 (illus.), 352.
  horned (illus.), 221.
  tent, 96, 97 (eggs, illus.).
Cecropia moth, 190.
Cerceris, 159.
Chestnut weevil, 96.
Chiton, 211, 212 (illus.).
Chrysididae, 159.
Cicada, 157 (illus.), 159.
Cockroach, 28, 96.
Codling moth, 95.
Conch, 210 (illus.), 212, 262, 263.
Conus gloria-maris, 49 (illus.), 50.
Copepod, 145.
Coral, 64.
Cotton-worm moth, egg (illus.), 95.
Crawfish, 207, 347.

Crustaceans, 145, 178, 179.
Cuckoo flies, 159.
Eumenes, 158, 159.
Fireflies (gen., illus.), 26-28.
Flies, house, 160, 161.
Fruit-fly, 96.
Hornet, 138 (nest, illus.), 157, 160.
  paper nest (stings, illus.), 161.
  sand, 159.
  sand hill, 157 (illus.), 159.
  white-faced black, 159 (illus.), 160.
Horntail, 95.
Hymenoptera, 97, 157, 158.
Ichneumonidae, 159.
Insect, eggs (gen., illus.), 95-97.
  stinging (gen., illus.), 157-161.
Jellyfish, 178, 209.
Jug-maker, 158, 159.
Lacewing-fly and eggs (illus.), 96.
Limpet, 211 (illus.), 212.
Littorina, 207.
Luna moth (illus.), 220.
Mealworm, 28.
Megachile, 161.
Mellow bug, 93.
Mites, 113.
Mollusks, 208, 209.
Moon-snail, 212.
Mosquito, 95 (egg, illus.), 96, 188.
Muscid-fly, egg (illus.), 95.
Mussel, 212.
Mutilla, 159.
Mutillidae, 159, 161.
Octopus, 117, 207.
Oxybelidae, 159.
Oysters, 207.
Papilio turnus, 99.
Pelopaeas, 159.
Pepsis, 158.
Periwinkle, 207, 209.
Philanthus, 159.
Pholas (gen., illus.), 364.
Polistes, 158.
  pallipes (illus.), 159.
Pompilus, 158.
Potato beetle, eggs (illus.), 96.
Sand-flea, 178.
Sand-hopper (gen., illus.), 178-179.
Scelephron, 159.
Sea-anemones, 178, 179.
Sea-urchin, 209.
Ship-worm, 365.
Snails (gen., illus.), 207-212, 262, 263.
  armadillo, 211, 212 (illus.).
Snout-beetle, 96.
Sphaerophthalma occidentalis, 159.
Sphecius, 158, 159.
Sphex, 158.
Spider, 94, 159, 160 (illus.).
Sponge, 209.
Squid beak, 174.
Starfish, 207.
Teredo, 365.
Termites, 66.
Tick, sheep, 95.
Trypoxylon, 159.
Vanessa californica, 124.
Vespa, 158.
  maculata, 159 (illus.), 160.
Walking-stick, 95 (egg, illus.), 96.
Warble fly, ox, 95.
Wasp, 157, 158, 159, 160, 161.
  digger, 159, 160 (illus.).
  gold, 159.
  mud-dauber, 158, 159, 161 (stings, illus.).
  paper nest, 159 (illus.), 161 (stings, illus.).
  wood-boring, 159.
Water-bug, giant, 95 (illus.), 96.
Xylocopa, 161.
Yellow-jacket, 157, 159, 160.

MAMMALS

Animals, help to live (gen., illus.), 351.
Antelope, 297.
Badger, 18, 298.
Basilosaurus, 46.
Bassariscus, 298.
Bat, hoary, 323.
  lump-nosed, 323.
  Mexican free-tailed, 323.
  red, 323.
  vampire, 14.
Bear, 47, 67, 78 (illus.), 123 (Mount Rainier National Park), 124, 130, 131, 138, 187 (Yellowstone National Park).
  black, 297, 298 (illus.).
  brown, 79-86 (gen., illus.).
  grizzly, 9 (protection), 118 (gen., illus.), 294, 297.
  Kadiak, 9, 80.
  peninsula brown, 9.
Beaver, 42 (gen., illus.), 84, 138, 294, 299 (illus.).
Bison, 297.
Bobcat, 297.
Buffalo, 294.
Camel, 47.
Capybara, 47.
Chickaree, 299.
Chipmunk, 282, 299, 307, 315 (illus.).
Citellus elegans, 299.
Cony, 307.
Cougar, 47, 282.
Coyote, 67, 298, 312.
Deer, 47, 74 (conservation), 84 (illus.), 138, 202 (fond of music), 266 (antlers), 267, 282, 290.
  bushbuck, 66.
  mule (illus.), 297.
  western white-tailed, 297.
  white-tailed, 64.
Dugong, 47.
Elk, 74 (conservation), 266, 297.
Eutamias, 299.
Ferret, black-footed, 298.
Fox, 47.
  kit, 298.
  Scott's gray, 298.
  western red, 298.
Groundhog, 354.
Ground squirrel, 299, 344.
  picket-pin, 299.
  Say's, 299.
Horse, three-toed, 47.
Jack rabbit, 18.
  black-tailed, 322.
  white-tailed, 322.
Jaguar, 10 (illus.), 11-15 (gen., illus.).
Kangaroo, 350.
Lion, 47.
Lynx, Canada, 298.
Mammals, Colorado (gen., illus.), 297-299, 322, 323.
Mammoth, 47.
Marmot, 18, 292 (illus.).
  yellow-bellied, 322.
Marten, 298.
Mastodon, 47.
Mink, 83, 298.
Mole, 322.
Monkey, 29, 32.
  howling, 13.
  spider, 13 (illus.), 14.
Moose, 42, 202 (fond of music).
Mountain goat, 62.
Mountain lion, 297.
Mountain sheep, 290, 296 (illus.), 297.
Mouse, field, 166.
  grasshopper, 298.
  Japanese waltzing (gen., illus.), 237-238.
  jumping, 298.
  meadow, 298.
  mountain harvest, 298.
  pocket, 298.
  red-backed, 298.
  rock, 298.
  white-footed, 298.
Muskrat, 298.
Otter, 298.
Peccary, 47.
Peromyscus, 298.
Phenacomys, 298.
Pig, giant, 47.
  wild, 11.
Pika, 322.
Pocket gopher, 298.
Porcupine, yellow-haired, 299.
Porpoises, 214.
Prairie dog, 286, 290, 298, 299, 312.
Rabbit, Baird's snowshoe, 322.
  cottontail, 322.
Raccoon, 298.
Rat, desert, 18.
  kangaroo, 298.
  wood, 290, 299.
Rhinoceros, 47.
Ring-tailed cat, 298.
Sea lion, Steller, 150 (illus.), 152, 153.
Seal, 214.
Seal, elephant (gen., illus.), 173-174.
Sheep, big-horn, 307.
Shrew, dusky, 322.
  long-tailed, 322.
  masked, 322.
  western water, 323.
Skunk, 67.
  hog-nosed, 298.
  spotted, 253 (gen., illus.), 298.
  striped, 298.
  white-backed, 298.
Sloth, giant ground, 47.
Spermophile, thirteen-lined, 299.
  spotted, 299.
Squirrel, 18, 62, 290.
  Abert, 299.
  antelope, 299.
  gray, 75.
  pine, 299, 307, 328.
  plain-backed, 299.
  red, 299, 353.
  Richardson pine, 203.
  rock, 299.
Tapir, 11, 47.
Tiger, saber-tooth, 47.
Tortoise-armadillo, giant, 47.
Ursus middendorffii, 9.
  gyas, 9.
Vole, lemming, 298.
  pygmy, 298.
Wapiti, 266.
Weasel, 298.
  Arizona, 298.
  dwarf, 298.
  long-tailed, 298.
Whale, 206 (illus.), 213-216 (gen., illus.).
Wolf, 47.
  gray, 298.
Wolverine, 298.
Zeuglodon, 46.

NATURE STUDY

Aquarium, Honolulu (gen., illus.), 117.
Bird study helps, 267.
Brookline Bird Club, 202.
Nature poem contest winners, 124.
Nature study, 254, 274, 275.
Nature study and radio, 194.
Pennsylvania State College Nature camps, 138.
Suggestions for Nature-study teachers, 189.
Wayside Museum of Archaeology, 129.
Yosemite School of Field Natural History, 274, 275.

PARKS AND REFUGES

Canadian bird refuges, 267.
Great Smoky Mountain National Park, 124, 264.
Mesa Verde National Park (gen., illus.), 289-291, 329.
Potomac Appalachian Trail Club, book, 124.
Quetico-Superior Council, 60.
Rocky Mountain National Park (gen., illus.), 305-307.

PHYSICAL PHENOMENA

Anemoscope, 22.
Glacier, 6 (measuring), 356 (gen., illus.).
  Chenaga (illus.), 358.
  Muir, 214, 215.
Weather vanes (gen., illus.), 21-25.

PLANTS, GENERAL

Achillea, 301.
Aconite, 303.
Algae, 169, 178, 191, 209, 211.
Anemone, 260.
  hupenhensis, 227.
Antirrhinum majus, 111.
Aplectrum spicatum, 347.
Aquilegia coerulea, 302.
Arabis, 169.
Arethusa, 52.
Argemone, 301.
Arnica, 302.
Artichoke (illus.), 154.
Aspidium, 345.
Aster, 303.
  summer, 158.
Avens, mountain, 303.
Bean, 290.
Beard tongue, 301, 302 (illus.).
Bedstraw, 302.
Bee plant, Colorado, 301.
Bellwort, 260.
Bistorta, 303.
Black-eyed susan, 344.
Blanket-flower, 302.
Blue bells, 301, 303.
Brown-eyed susan, 302.
Buckwheat, flowering, 303.
Bugle weed, 345.
Burdock (gen., illus.), 174.
Burs of plants (gen., illus.), 97, 161, 174, 347.
Butter-and-eggs, 113.
Butterweed, 301, 303.
Cabbage, 154, 155 (illus.).
Calochortus gunnisoni, 302.
Calopogon pulchellus, 153.
Caltha leptosepala, 303.
Calypso, 324.
Campion, 347.
Castilleja, 301, 302.
Cat-tail, 168, 222.
Cherokee plant lore of the Smokies (gen., illus.), 343-347.
Chimney garden (gen., illus.), 116-117.
Chrysanthemum, 184, 185.
Cinquefoil, 324.
Claytonia, 301.
Cleome, 301.
Clintonia, 192.
Clover, dwarf, 303.
  Japanese, 347.
  white, 345.
Colorado gardens (gen., illus.), 312-313.
Columbine, 302, blue (illus.), 315.
  wild, 259, 260.
Corydalis, 301.
Cowbane, 346.
Cow parsnip, 84.
Cracca virginia, 347.
Cranesbill, 302.
Cress, bitter, 303.
Dahlia, 183, 184.
Daisy, 302.
  Easter, 300.
Deer's tongue, 302.
Delphinium (gen., illus.), 225-228.
Disporum lanuginosum, 345.
Dodecatheon, 302.
Eel grass, 144, 146, 262.
Elephant ear, blooms (gen., illus.), 58.
Elephant plant, red, 303.
Enchanter's nightshade, 347.
Epilobium angustifolium (gen., illus.), 367.
Erigeron canadense, 345.
Eritrichium, 303.
Eryngium, 344.
Erysimum, 301.
Erythronium, 303.
Evening star, western, 301.
Ferns, 170.
  maiden-hair, 345.
  ostrich, 116.
  rock, 170.
  shield, 345.
Fireweed (gen., illus.), 367.
Fleabane, 345.
Flora of Colorado (gen., illus.), 300-303, 324.
Flowers, rare, and birds (gen., illus.), 49-52.
Forget-me-not, 116, 169.
  mountain, 303.
Frasera speciosa, 302.
Fuller's thistle, 354.
Gaillardia, 302.
Galium, 302.
Garden helps, 61, 63, 65, 125, 126, 127, 183, 184, 185, 255, 256, 257, 258.
Garden pools (gen., illus.), 167-170.
Gay-feather, 312.
Gentian, 302, 303.
  alpine, 303.
  fringed, 300 (illus.), 303.
Gentiana romanzovii, 303.
Geranium, 302.
Gilia, 301, 302, 312.
Ginseng, 345.
Gladiolus, 116, 256.
Globe flower, 303.
Goat's rue, 347.
Gold flower, alpine, 303.
Golden pea, 301.
Goldenrod, 303.
Golden smoke, 301.
Goldthread, 192.
Grass, buffalo, 294.
  grama, 294.
Habenaria lacera, 52.
Harebell, 300 (illus.), 303, 312.
Helianthus, 301.
Hollyhock, 228.
Honeysuckle, fly, 324.
Indian names of plants, 343-347.
Indian paint brush, 301 (illus.), 302.
Indian pipe, 324.
Iris, 116, 125, 312.
Jacob's ladder, 228.
Jamesia, 324.
Jimson weed, 347.
Job's tears, 344.
Johnny-jump-up, 116, 300.
Ladies' slipper, 260, 344.
  golden, 324.
  pink, 259.
  yellow (illus.), 346.
Lady's tresses, 324.
Larkspur, 301, 302.
  Geyer's, 312.
Leucocrinum montanum, 300.
Lichens, 191, 324, 344.
Lilium, 302.
Lily, 257.
  day, 228.
  Mariposa, 301 (illus.), 302.
  mountain, 302.
  regal, 228.
  sand, 300, 312.
  sego (illus.), 301.
  wood, 302.
Linnaea americana, 303.
Liverwort, 191, 345.
Lithospermum, 301.
Loco weed, 301, 302 (illus.).
Lupine, 301 (illus.), 312.
Lycopus virginicus, 345.
Mallow, scarlet, 301.
Marsh marigold, white, 303.
May-apple, 344.
Meadow rue, 302.
Mentzelia, 301.
Mertensia, 301, 303.
Milkweed, 345.
Mimulus, 324.
Moneses uniflora, 303.
Monkey-flower, 303.
Monkshood, 302.
  purple, 303.
Montbretia, 257.
Mosses, 191.
Onion, 154, 156 (illus.).
Orchid, 52 (gen., illus.), 324.
  coral-root, 324.
  ragged-fringed (illus.), 52.
  showy (illus.), 344.
Orchis spectabilis (illus.), 344.
Oxypolis rigidior, 346.
Panax quinquefolium, 345.
Pansy, 116.
Pasque flower 301.
  hairy-coated, 301, 303 (illus.).
Passion flower (illus.), 346.
Pentstemon, 301, 302, 312.
Petunia, 116.
Phyllosticta antirrhini, 113.
Pine drops, 324.
Pink, grass (gen., illus.), 153.
  mountain, 303.
Pitcher-plant, 260.
Plankton, 178.
Plants That Improve on Acquaintance (gen., illus.), 179.
Plant World (rev.), 4.
Podophyllum, 344.
Pogonia, 52.
Poppy, 312.
  California, 312.
Porteranthus trifoliata, 345.
Potato vine, 347.
Prickly-poppy, white, 301.
Primrose, alpine, 303, 328.
  evening, 228, 300.
  Parry's, 303 (illus.), 324.
Primula parryi, 303.
Prosartes, 345.
Puccoon, yellow, 301.
Puff ball, 344, 345.
Pulsatilla hirsutissima, 301.

Rabbit-brush, 290.
Ramstead weed, 113.
Rattlesnake master, 344, 347.
Rock garden, 127.
Rose crown, 324.
Rudbeckia, 302, 344.
Rydbergia, 303.
Saltbush, gray, 290.
Sarsaparilla, 192.
Saxifrage, dwarf, 303.
Sea lavender, 312.
Seaweed, 144, 145, 146.
Sedge, 84.
Sedum, 116, 301.
Senna, wild, 345.
Sieversia, 303.
Silene, 303.
  stellata, 347.
Skullcap, 345.
Skunk cabbage, 222.
Snakeroot, black, 345.
  Virginia, 345.
Snapdragon (gen., illus.), 111-113.
Soapweed (illus.), 300.
Solomon's seal, 345.
Spanish-needle, 97, 347.
Sphaeralcea, 301.
Sphagnum, 52.
Spiranthes, 324.
Spring beauty, 301.
Star, shooting, 302.
Stone-crop, yellow, 301.
Stypticus panus, 345.
Sundew, 260.
Sunflower, 97, 301.
Tassel flower, 345.
Teasel (gen., illus.), 354.
Thermopsis, 301.
Tick trefoil (gen., illus.), 347.
Toadflax, 113.
Toothwort (illus.), 345.
Trifolium, 303.
Trillium, 260.
  grandiflorum, 238.
  painted, 192.
  white (gen., illus.), 238.
Trollius, 303.
Turret plant, 301, 302.
Turtlehead, pink, 51.
Twin flower, 303.
Twisted stalk, 192.
Umbrella plant, 168.
Vaccinium, 303.
Vegetable beauty (gen., illus.), 154.
Veronica (gen., illus.), 342.
Vetch, 345.
Viola nuttallii, 300.
  pedata (illus.), 343.
Violet, 344.
  dog-tooth, 292 (illus.), 303, 328.
Wallflower, 301.
  western, 312.
Water hyacinth, 168.
Waterlilies, 167, 168, 170.
Waxflower, 324.
Wintergreen, one-flowered, 303.
  spotted, 344.
Yarrow, 301.

REPTILES AND AMPHIBIANS

Alligator, 11, 93, 94.
Boa, house (gen., illus.), 363.
Bullfrog, 92, 93.
Cerastes vipera, 115.
Chelydra serpentina, 166.
Crotalus scutulatus, 372.
Frog, 38 (swallowing toad, gen., illus.), 223.
  alligator (gen., illus.), 92-94.
  green, 94.
  tree (gen., illus.), 222-224.
  western tree (illus.), 222.
Horned toad, 28, 312, 372.
Hyla crucifer, 222.
Hyla regilla, 222 (illus.), 223.
Lizard, 28, 321.
  giant water, 258.
  horned (gen., illus.), 28.
  regal horned, 372.
Phrynosoma regale, 372.
Rana, 93.
Rana catesbeiana, 92.
Rana heckscheri, 92.
Rattlesnake, 286, 347, 372 (gen., illus.).
Salamander, 223.
Snake, 93, 321.
  black, 347.
  garter, 166.
  king, 347.
  rolling (gen., illus.), 115.
  sun-ray, 258.
  tail-biting, 258.
Snakes of the World (rev.), 4.
Toad, 28, 223.
Turtle, 93, 128.
  snapping (gen., illus.), 166.

TREES AND SHRUBS

Abies arizonica, 317.
  concolor, 317.
  lasiocarpa, 317.
Alder, 80, 82, 86, 118, 222, 223, 224.
Arbor vitae, 191, 192.
Arctostaphylos uva-ursi, 301.
Argyroxiphium macrocephalum, 179.
Arsenococcus ligustrinus, 93.
Ash, 239, 241.
  black, 241.
  white, 241.
Aspen, 52, 279, 318.
  big-toothed, 240, 241 (illus.).
  quaking, 302, 322.
Azalea, 200, 201.
Balsam, 344.
Balsam of Peru (gen., illus.), 369.
Beech, 122, 239.
  weeping (gen., illus.), 59.
Berberis aquifolium, 301.
Blueberry, 84, 303.
Birch, 192, 240.
  gray, 239 (catkins, illus.), 240.
  river, 240.
  sweet, 239 (catkins, illus.), 240.
  yellow, 52, 240.
Burl, white oak (illus.), 365.
Butternut, 242, 243 (illus.).
Cactus, 286, 300 (ball), 312.
  prickly pear, 192, 300.
Catalpa, 239, 240 (pod, illus.).
Cedar, 321, 344.
  Rocky Mountain red, 317.
  Virginia red, 312.
  western silver, 313.
  white, 191.
Ceiba tree, 13, 14, 179.
Cherry, 264.
  wild, 99.
Chestnut, 264.
Chokeberry, 290.
Coconut palm, 179.
Coffee tree, Kentucky (pod, illus.), 240.
Colorado trees (gen., illus.), 316-318, 327.
Cornel, dwarf, 260, 302.
Cornus canadensis, 302.
Cottonwood, 73 (fused by lightning), 286, 294, 318.
  Fremont's, 361.
  lance-leaved, 361.
  Mexican, 361.
  narrow-leaved, 361.
  Tweedy's, 361.
  western (gen., illus.), 361.
Cypress, 93.
  bald, 192.
Cyrilla racemiflora, 93.
Currant, flowering, 324.
Devil's club, 80.
Dogwood, 259, 260.
  Siberian, 312.
Dryas, 303.
Dutch elm disease (gen., illus.), 224.
Elm, 122, 224, 239, 240, 241.
  American, 241.
  English, 241.
  rock, 241.
  slippery, 241.
  white, 241.
Euphorbia, 29.
Fig tree, 29.
Fir, 307.
  alpine, 203, 302, 303, 317.
  balsam, 149.
  cork-bark, 317.
  Douglas, 203, 289, 317, 321.
  red, 317.
  white, 317.
  yellow, 317.
Franklinia, 49 (blossom, illus.), 51.
Ginkgo, 122.
Gooseberry, 290.
Gordonia, 51.
Grape, Oregon, 301.
Greasewood, 290, 322.
Gum, black, 93.
Hawthorn, 324.
Heath, 191.
Hemlock, 344.
Hickory (nut, illus.), 240, 242.
Holly, 52, 344.
Hornbeam, hop, 239, 241 (illus.).
Huckleberry, 89.
  box (illus.), 51.
Ivy, English, 222, 223, 224.
  poison, 346.
Juneberries, 114.
Juniper, 289, 313, 317.
  dwarf, 318.
  one-seed, 317.
  Utah, 317.
Kinnikinnik, 301.
Larch, 52.
  American, 191.
Laurel, 344.
  mountain, 201, 264.
Leather wood, 192.
Locust, honey, 239, 240 (pods, illus.).
Magnolias, 122, mountain (illus.), 344.
Mahogany, mountain, 289, 324.
Manzanita root (gen., illus.), 172.
Maple, 192, 241-242 (seeds, illus.).
  sugar, 48 (gen., illus.).
Mistletoe, 344.
Monkey puzzle tree, 222, 223, 224.
Ninebark, 324.
Oak, 122, 192, 242.
  black (acorn, illus.), 242.
  bur (acorn, illus.), 242.
  chestnut (acorn, illus.), 242.
  pin (acorn, illus.), 242.
  red (acorn, illus.), 242.
  scarlet (acorn, illus.), 242.
  scrub, 242 (acorn, illus.), 289, 321.
  shingle (acorn, illus.), 242.
  Spanish, 87.
  swamp white (acorn, illus.), 242.
  white, 242 (acorn, illus.), 365 (burl, illus.).
Olive, Russian, 312.
Pea tree, Siberian, 312.
Pear, prickly, 290.
Pepper tree, 193.
Physocarpus, 324.
Picea engelmannii, 317.
  pungens, 313, 317.
Pieris nitida, 93.
Pine, 122, 294, 344.
  Austrian, 312.
  bristle-cone, 312, 317.
  limber, 312, 317.
  lodgepole, 62, 298, 299, 302, 307, 317, 322.
  Norway, 312.
  Oregon, 317.
  pinyon, 312, 317.
  sugar, 265.
  western yellow, 312, 317.
  white, 317.
  yellow, 299, 302, 307, 321.
Pinus aristata, 317.
  contorta, 317.
  edulis, 317.
  flexilis, 317.
  ponderosa, 317.
Pinyon, 289, 290, 321.
Poplar, 239, 240.
Populus tremuloides, 318.
Pseudotsuga taxifolia, 317.
Redbud, 260.
Rhododendron, 200, 201, 264, 345 (illus.).
Ribes aureum, 324.
Rose, 127.
  wild, 345.
Rubus, 324.
Sagebrush, 322.
Salmon-berry, 118, 149, 150.
Service-berry, 114.
Silk cotton tree, 179.
Shadblow, 114.
Shadbush (gen., illus.), 114.
Shortia galacifolia, 50 (illus.), 51.
Silver sword plant (illus.), 179.
Smilax, 347.
Spanish bayonet (illus.), 300.
Spruce, 52, 84, 191, 243, 280, 294, 298, 299, 307, 330, 344.
  Black Hills, 312.
  Colorado blue, 313, 316 (illus.), 317.
  Engelmann, 203, 302, 303, 317, 322.
  red, 317.
  yellow, 317.
Sugar plum, 114.
Sumac, mountain, 324.
  three-leaved, 290, 324.
Sycamore, 239, 241 (balls, illus.).
Tamarack, 52, 191.
Thimble berry, 324.
Thorn-tree, 29, 30, 31.
Tree fruits (gen., illus.), 239-243.
Tree-planting, 54-55, 62, 98-99, 175-177.
Tulip tree, 192, 264.
Tupelo, 93.
Willow, 239, 240, 243, 322.
Witch hopple, 192.
Yucca, 286, 290, 291 (illus.), 300 (illus.), 312.
  baccata, 290.

MISCELLANEOUS

Agate and moonstone, June birthstones (gen., illus.), 368-369.
Amethyst, February birthstone (gen., illus.), 109-110.
Audubon Home, Inc., 182.
Billboards, 6.
  Sweden (gen., illus.), 244-248.
Biography, Buckwalter, T. V., 362.
  Maydell, Baron Ernst von (gen., illus.), 102-104.
  Ray, John (illus.), 37-38.
  Weston, Edward (gen., illus.), 154-156.
Birthstones, 53, 109, 171, 249, 319, 368.
Blatchleyana (rev.), 135-136.
Bloodstone and Aquamarine (gen., illus.), 171-172.
Brahmaputra canyon, 266.
Caribbean cruises, 3, 5, 7.
Changing climate, 191, 192.
Child and Universe (rev.), 73.
Colorado, editorial, 277.
  History (gen., illus.), 293-295, 325, 326.
  mountains (gen., illus.), 279-282, 328.
  natural resources (gen., illus.), 293-295, 325, 326.
  plains and mountains (gen., illus.), 308-310, 330, 331.
Coquina, 47.
Diamond (gen., illus.), 249-250.
Emerald (gen., illus.), 319-328.
Florida geology (gen., illus.), 43-47, 64.
Garnet (gen., illus.), 53.
Ilmenite, 64.
Limestone, Ocala, 44, 45, 46.
  oolitic, 47.
Photography, 2, 16-17, 70, 134, 198, 271, 272, 273, 274.
Washington, George (illus.), 98-99.
Zircon, 64.

INDEX TO AUTHORS IN VOL. XIX

Aaron, S. F., 157-161.
Ames, Jane D., 110.
Bailey, A. M., 162-166.
Beebe, W., 143-146, 186, 187, 207-212, 262, 263.
Blauvelt, H., 42.
Bruderlin, K., 300-303, 324.
Carey, R. F., 38.
Carhart, A. H., 312-313.
Cederstrom, S. M., 166.
Champlain, A. B., 355.
Cochran, Doris M., 28.
Colmar, B. B., 362-363.
Cowles, R. B., 29-32, 66.
Dickey, S. S., 52.
Dillman, E. L., 59.
Dubose, C. H., 224.
DuPuy, W. A., 352-354.
Edwards, R. T., 175-177.
Franke, P. R., 289-291, 329.
Fry, G., 99.
Gill, T., 11-15.
Gress, E. M., 114.
Gunter, H., 43-47, 64.
Hafen, L. R., 293-295, 325, 326.
Hansen, A. A., 342.
Hansen, A. A., and Honeywell, E. R., 111-113.
Harper, F., 92-94.
Harris, K., 350.
Haweis, S., 117.
Honeywell, E. R., and Hansen, A. A., 111-113.
Howes, P. G., 351.
Hull, R. B., 217-219.
Kelsey, F., 179.
Krows, R., 367.
Lampman, B. H., 178-179, 364-365.
Lewis, Isabel M., 56-58, 119-121, 180-181, 251-253, 320, 323, 370-372.
Loken, A. B., 354.
Lutz, H. J., 356-359.
McAtee, W. L., 248.
McMechen, E. C., 279-282, 328.
Marten, J. W., 366-367.
Mason, Ethel I., 49-52.
Mason, R. L., 343-347.
Miller, Ellen H., 25.
Miller, F. W., 297-299, 322, 323.
Miller, Salome C., 97, 161, 174, 347.
Mosauer, W., 115.
Olson, Alma L., 244-248.
Pack, A. N., 79-86, 130, 131, 147-153, 213-216.
Pack, C. L., 54-55, 62, 98-99, 348.
Parker, G., 316-318, 327.
Peterson, R. T., 105-108.
Phillips, M. E., 95-97.
Pickwell, G., 222-224.
Pilkington, Marie, 37-38.
Pletcher, Dorothy, 102-104, 225-228.
Pohndorf, A., Jr., 53, 62, 109-110, 171-172, 249-250, 319, 328, 368-369.
Preble, E. A., 48, 243, 250.
Ravens, Louise, 238.
Reichard, L. E., 26-28.
Retsloff, D. C., 363.
Robinson, Mary F., 239-243.
Rockwell, R. B., 284-288, 321, 322.
Rogers, J. G., 308-310, 330, 331.
Romanes, R. A., 87-91.
Schantz, O. M., 116-117.
Scoville, S., Jr., 339-342.
Shanafelt, Marjorie, 349-350.
Sharp, D. L. 18-20.
Shore, A., 118.
Smith, Gretchen, 369.
Speiden, Jeanette, 39-42.
Stebbins, H. E., 237-238.
Talman, C. F., 21-25.
Tharp, W. E., 365.
Tippetts, Katherine B., 231, 234-235.
Towne, Mary E., 361.
Vorhies, C. T., 372.
Walker, L. W., 173-174 253.
Ware, R. B., 167-170.
Watts, V. M., 153.
Weston, F. M., 58.
Westwood, R. W., 154-156, 360-361.
Wright, A. K., 172.
Yeager, D. G., 305-307.

BIRDS OF THE STATES

On pages 229 to 236 of the April Nature Magazine there were published eight pages devoted to The Birds of the States. This was the first section of a sixteen-page special colored feature devoted to this subject. The remaining twenty-four colored pictures of the State Birds will be published in subsequent issues.

HOWEVER

The entire booklet is now available, including colored pictures and correlative text of thirty birds, plus the article and other color published in the April issue of Nature Magazine. It is of special value in connection with school Nature Study and Geography work. No comparable compilation, illustrated in color, has been made. The booklet is full magazine size.

Orders may be placed now for this attractive feature, which will be mailed flat to purchasers.

Orders for single copies will be fifty cents a copy; for more than ten copies the price will be twenty-five cents a copy.

Use coupon below or write a letter.

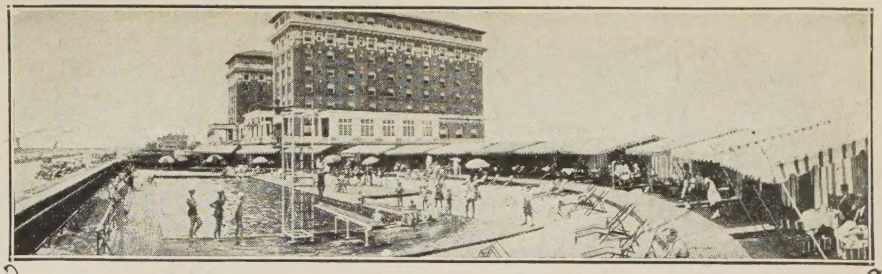
American Nature Association
1214 Sixteenth Street, N. W.
Washington, D. C.

Please mail me_____copies of "Birds of the States". I enclose $_____

NAME _____

STREET _____

CITY AND STATE _____



The Admiral

On the Beach Front at Cool Cape May, N. J.

A beautiful modern fireproof hotel offering accommodations of the highest type—350 rooms with bath.

Rates Exceedingly Modest

OPENS JUNE 15th

GOLF · TENNIS · BOATING

Surf Bathing directly from Hotel. Outdoor Sea Water Swimming Pool. Concert and Dance Orchestra . . Social Hostess

GEORGE M. BOUGHTON, *Managing Director*

The Nature Almanac

A Hand Book of Nature Education

ARTHUR NEWTON PACK
E. LAURENCE PALMER

312 Pages, Size 6¼ x 8½ in.
Handsomely Bound

ONLY $1 PREPAID

After reading the list of contents of the Nature Almanac — any nature lover will realize that here is the book they have often wished for—and for only One Dollar

The supply is limited
Order now from

NATURE MAGAZINE
1214 Sixteenth Street, N. W.
Washington, D. C.

BIRD AND ANIMAL PAINTINGS

By R. Bruce Horsfall

ONLY $1.50

MANY readers of Nature Magazine have asked when the beautiful color pictures of birds, mammals and insects that have appeared in Nature Magazine would be available separate from the Magazine. The demand has been so insistent that this is the result:

A beautifully printed book containing 168 pictures in full colors, three and one-half by two and one-half inches, and a beautiful frontispiece has been printed and is now available.

Each picture is accompanied by concise description of the character and habits of the subject.

Helpful suggestions are included to show the use of the book for school, camp, home and other educational purposes.

Despite the high cost of color plates and printing all this will cost the readers of Nature Magazine,—

MAIL COUPON AND $1.50

American Nature Association
1214 Sixteenth Street, Washington, D. C.

Enclosed please find $..... for ..... books of R. Bruce Horsfall's Bird and Animal Paintings.

Name.....

Street Address.....

City.....

State.....

Please make address complete and legible

THE RUBY-THROATED HUMMINGBIRD
(*Archilochus colubris*)